

OIL PRICE DYNAMICS REPORT

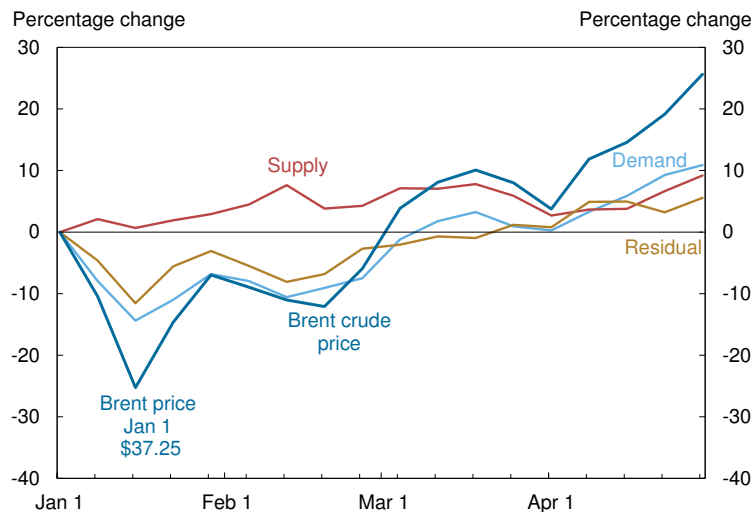
Updated: May 2, 2016

Oil prices rose over the past week, supported by improving demand and tighter supply

- As demand expectations continued to improve and supply conditions tightened further, oil prices rose again in the past week, returning to the same levels seen at the start of October last year. Since the beginning of 2016:Q1, reassessment of global demand expectations has been a somewhat more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Jan 1-Apr 29, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

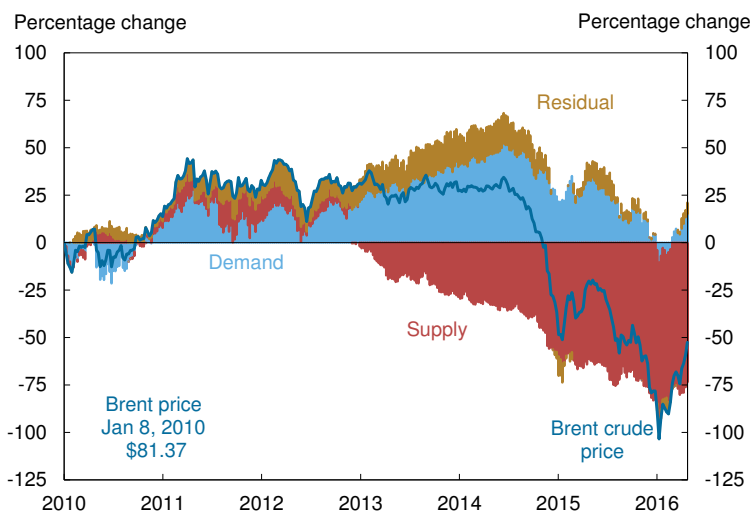
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from January 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since January 1, 2016

	Demand	Supply	Rest	Brent
Apr 15, 2016	5.9	3.8	5.0	14.6
Apr 22, 2016	9.3	6.7	3.2	19.1
Apr 29, 2016	10.9	9.2	5.6	25.6

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

Oil Price Decomposition Q&A

1) What is the goal of the oil price decomposition?

Our aim is to determine how much of the observed oil price change has been driven by demand and supply factors.

2) What is the modeling strategy?

Using a statistical model and a large number of financial variables, we decompose weekly oil price changes into demand effects, supply effects, and an unexplained residual.

Sparse partial least squares regression allows us to construct linear combinations from the variables in our financial market data set—called factors—which have maximum explanatory content for oil price changes. We first use this procedure to generate factors that best capture the patterns in the data, and then examine the estimated factors to determine how they reflect demand or supply dynamics.

The model is re-estimated every week using weekly data from January 1986 through the close of business on Friday of the most recent week. Over this sample, the model can explain about two-thirds of the weekly oil price dynamics.

3) How to interpret the results?

The output of the model is used to decompose weekly changes in an accounting sense. More specifically, the weekly Brent crude price change always equals the change explained by demand factors plus the change explained by supply factors plus a residual (the weekly change unexplained by the sum of the estimated demand and supply factors).

Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

References

- Groen, J., and P. Russo. 2015. "Is Cheaper Oil Good News or Bad News for the U.S. Economy?" *Liberty Street Economics*, June 8.
- Groen, J., K. McNeil, and M. Middeldorp. 2013. "A New Approach for Identifying Demand and Supply Shocks in the Oil Market." *Liberty Street Economics*, March 25.

Authors

Jan Groen and Patrick Russo

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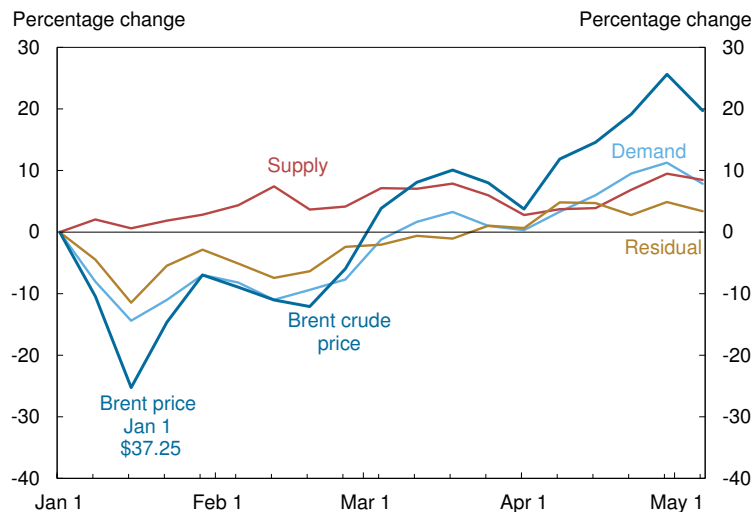
Updated: May 9, 2016

Oil prices declined in the past week, mainly in response to changed demand perceptions

- Oil prices fell over the past week, largely owing to deteriorating demand conditions. Since the beginning of 2016:Q1, reassessment of global demand expectations has been a somewhat more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

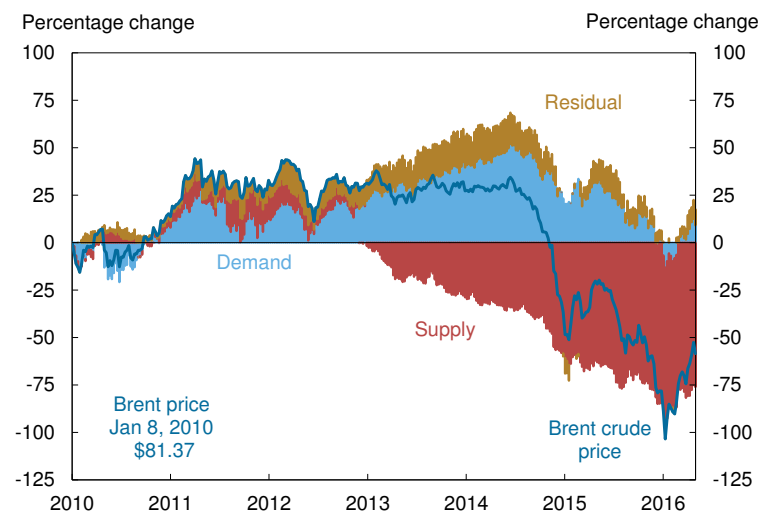
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Cumulative Weekly Decomposition, Jan 1-May 6, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
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 Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from January 1, 2016.
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Cumulative Percentage Changes since January 1, 2016

	Demand	Supply	Rest	Brent
Apr 22, 2016	9.5	6.9	2.8	19.1
Apr 29, 2016	11.3	9.5	4.9	25.6
May 06, 2016	7.9	8.5	3.4	19.7

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

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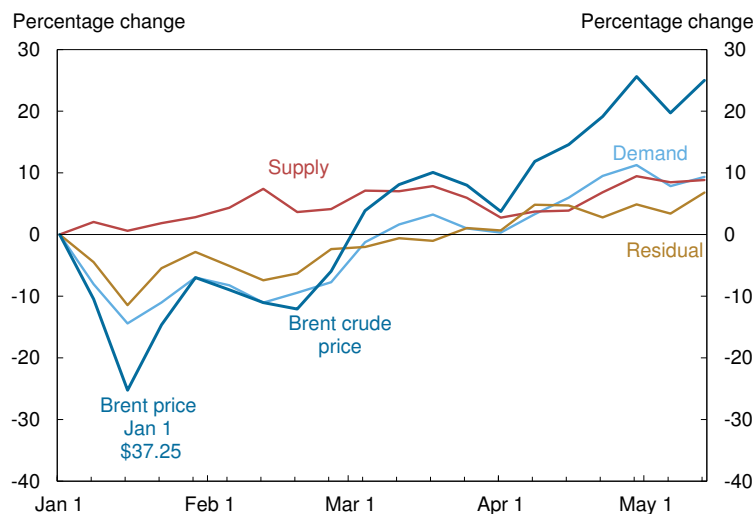
Updated: May 16, 2016

Oil prices rose in the past week, mostly owing to the residual, but also to somewhat improved demand

- Oil prices recovered over the past week, largely owing to the residual and, less so, to improving demand conditions. Since early 2016:Q1, reassessment of global demand expectations has been a somewhat more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

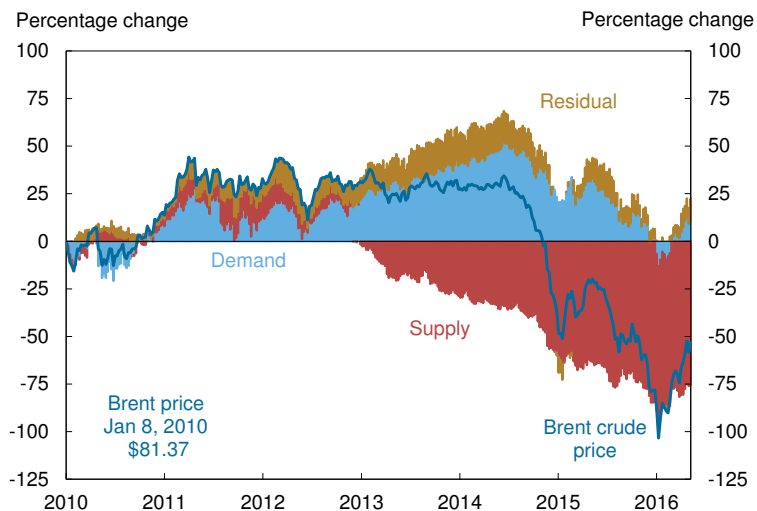
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Cumulative Weekly Decomposition, Jan 1-May 13, 2016



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 Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

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- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since January 1, 2016

	Demand	Supply	Rest	Brent
Apr 29, 2016	11.3	9.5	4.9	25.6
May 06, 2016	7.9	8.5	3.4	19.7
May 13, 2016	9.3	8.8	6.8	25.0

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

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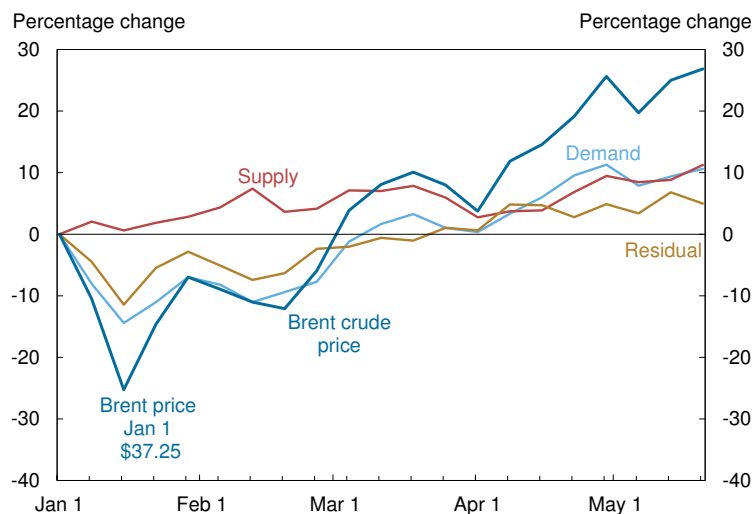
Updated: May 23, 2016

Oil prices rose in the past week, driven by tighter supply conditions and higher perceived demand

- Oil prices continued their upward path over the past week as oil supply conditions tightened, perceived demand improved, and the residual dropped. Since early 2016:Q1, reassessment of global demand expectations has been a slightly more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

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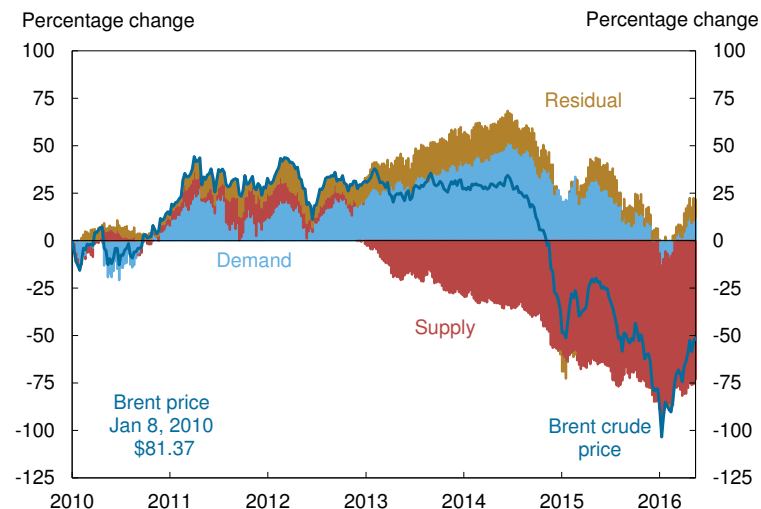
Cumulative Weekly Decomposition, Jan 1-May 20, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from January 01, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since January 01, 2016

	Demand	Supply	Rest	Brent
May 06, 2016	7.9	8.5	3.4	19.7
May 13, 2016	9.4	8.8	6.8	25.0
May 20, 2016	10.6	11.3	5.0	26.8

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

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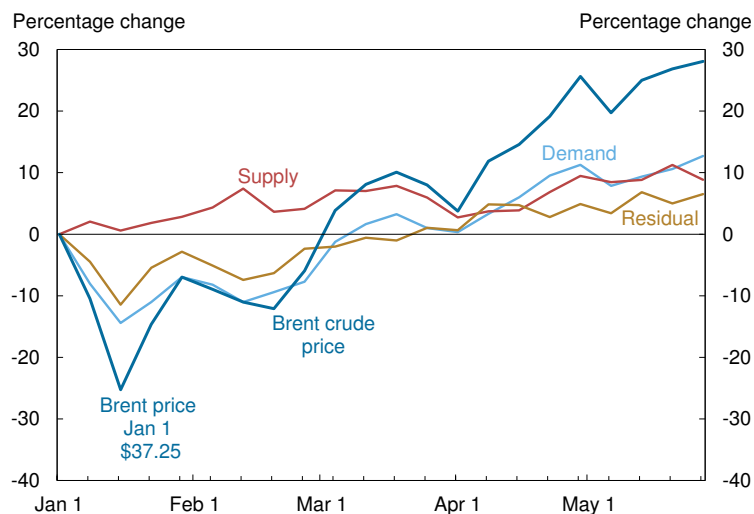
Updated: May 31, 2016

Oil prices rose in the past week, driven by higher perceived demand

- Oil prices continued their upward path over the past week as perceived oil demand improved. Supply conditions, however, loosened somewhat. Since early 2016:Q1, reassessment of global demand expectations has been a slightly more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

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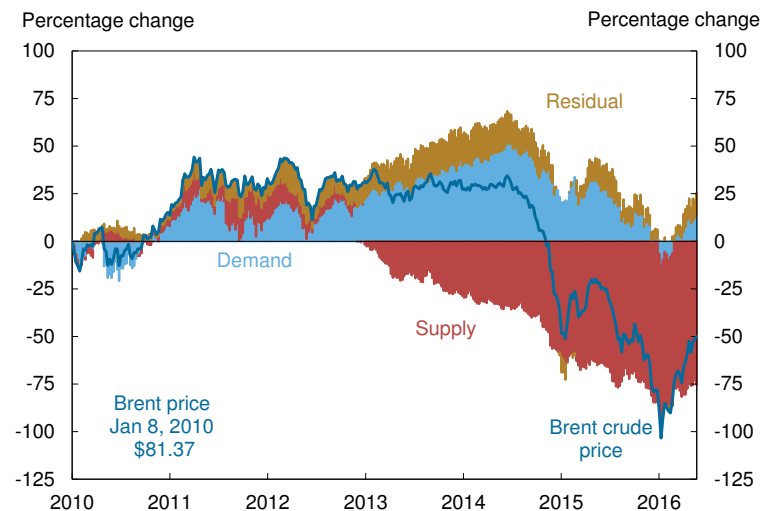
Cumulative Weekly Decomposition, Jan 01-May 27, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

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Cumulative Percentage Changes since January 01, 2016

	Demand	Supply	Rest	Brent
May 13, 2016	9.4	8.8	6.8	25.0
May 20, 2016	10.6	11.3	5.0	26.8
May 27, 2016	12.7	8.9	6.5	28.1

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

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3) How to interpret the results?

The output of the model is used to decompose weekly changes in an accounting sense. More specifically, the weekly Brent crude price change always equals the change explained by demand factors plus the change explained by supply factors plus a residual (the weekly change unexplained by the sum of the estimated demand and supply factors).

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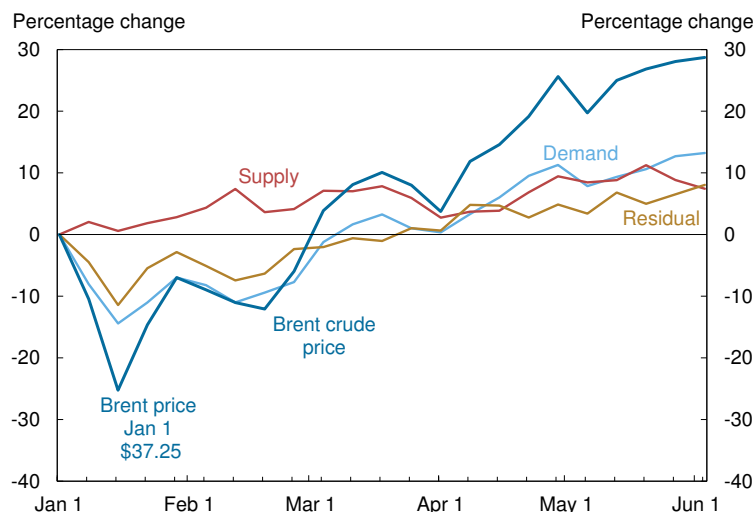
Updated: June 6, 2016

Oil prices scarcely moved over the past week, with expanded supply offsetting higher demand and the residual.

- Perceived oil demand improved somewhat and the residual increased, but supply conditions loosened; these moves left oil prices essentially unchanged over the past week. Since early 2016:Q1, reassessment of global demand expectations has been a slightly more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

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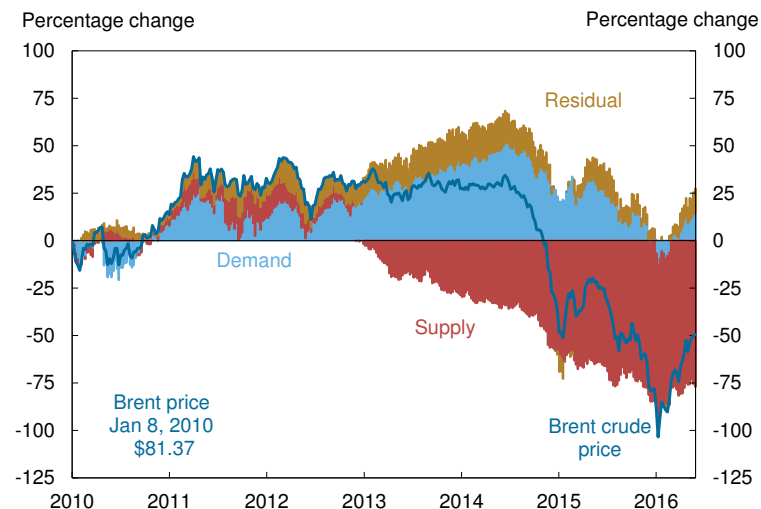
Cumulative Weekly Decomposition, Jan 01-Jun 03, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

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Cumulative Percentage Changes since January 1, 2016

	Demand	Supply	Rest	Brent
May 20, 2016	10.6	11.3	5.0	26.8
May 27, 2016	12.7	8.9	6.5	28.1
Jun 03, 2016	13.2	7.4	8.1	28.7

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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3) How to interpret the results?

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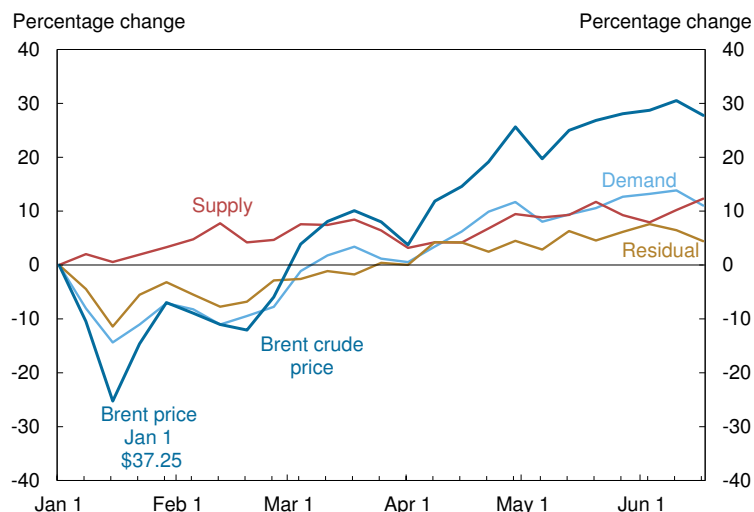
Updated: June 20, 2016

Oil prices ticked down over the past week on account of weaker demand conditions and a decreasing residual.

- Despite somewhat tighter supply conditions over the past week, oil prices decreased as perceived demand deteriorated and the residual fell. Since early 2016:Q1, reassessment of global demand expectations has been a slightly more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

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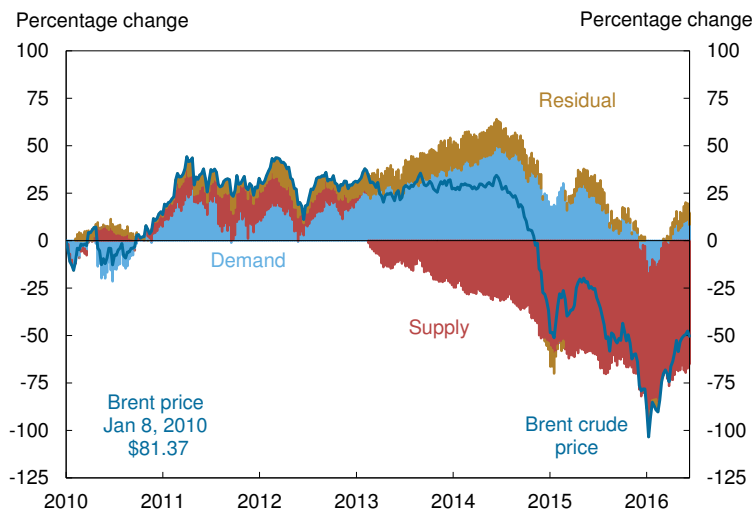
Cumulative Weekly Decomposition, Jan 01-Jun 17, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

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Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

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Cumulative Percentage Changes since January 1, 2016

	Demand	Supply	Rest	Brent
Jun 03, 2016	13.2	7.9	7.6	28.7
Jun 10, 2016	13.8	10.2	6.5	30.5
Jun 17, 2016	11.0	12.3	4.4	27.8

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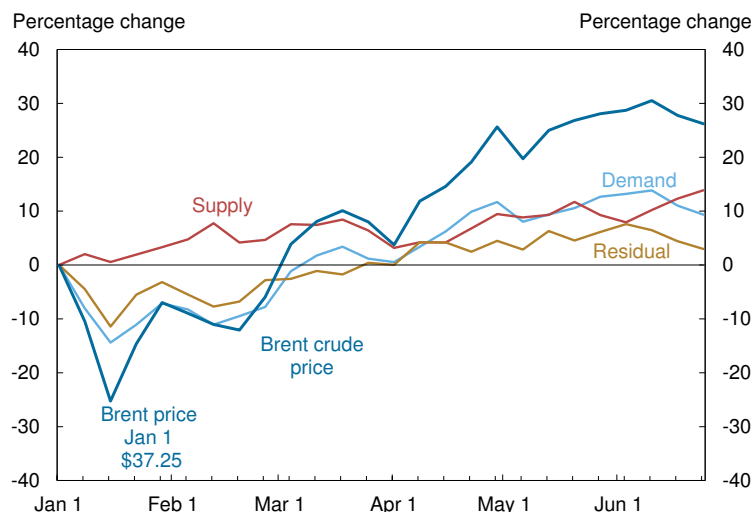
Updated: June 27, 2016

Over the past week, oil prices continued to tick down owing to weaker demand conditions and a decreasing residual.

- Although supply conditions tightened again over the past week, perceived demand and the residual continued to decrease, resulting in another oil price decline. Since early 2016:Q1, reassessment of global demand expectations has been a slightly more prominent driver of oil price movements than perceived supply conditions.
- These developments follow the sustained oil price weakness over 2015:Q4, which was predominantly supply-driven.
- Oil price declines in Q2 and Q3 of last year were influenced more heavily by global demand expectations—a pattern at odds with the supply-driven declines seen in 2012-14.

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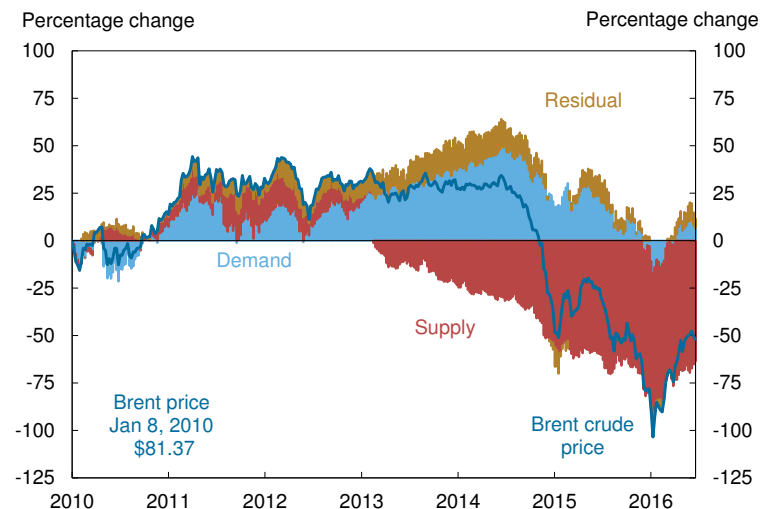
Cumulative Weekly Decomposition, Jan 01-Jun 24, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from January 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since January 1, 2016

	Demand	Supply	Rest	Brent
Jun 10, 2016	13.8	10.2	6.5	30.5
Jun 17, 2016	11.0	12.3	4.4	27.8
Jun 24, 2016	9.3	13.9	3.0	26.2

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

Oil Price Decomposition Q&A

1) What is the goal of the oil price decomposition?

Our aim is to determine how much of the observed oil price change has been driven by demand and supply factors.

2) What is the modeling strategy?

Using a statistical model and a large number of financial variables, we decompose weekly oil price changes into demand effects, supply effects, and an unexplained residual.

Sparse partial least squares regression allows us to construct linear combinations from the variables in our financial market data set—called factors—which have maximum explanatory content for oil price changes. We first use this procedure to generate factors that best capture the patterns in the data, and then examine the estimated factors to determine how they reflect demand or supply dynamics.

The model is re-estimated every week using weekly data from January 1986 through the close of business on Friday of the most recent week. Over this sample, the model can explain about two-thirds of the weekly oil price dynamics.

3) How to interpret the results?

The output of the model is used to decompose weekly changes in an accounting sense. More specifically, the weekly Brent crude price change always equals the change explained by demand factors plus the change explained by supply factors plus a residual (the weekly change unexplained by the sum of the estimated demand and supply factors).

Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

References

- *Groen, J., and P. Russo.* 2015. "Is Cheaper Oil Good News or Bad News for the U.S. Economy?" *Liberty Street Economics*, June 8.
- *Groen, J., K. McNeil, and M. Middeldorp.* 2013. "A New Approach for Identifying Demand and Supply Shocks in the Oil Market." *Liberty Street Economics*, March 25.

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OIL PRICE DYNAMICS REPORT

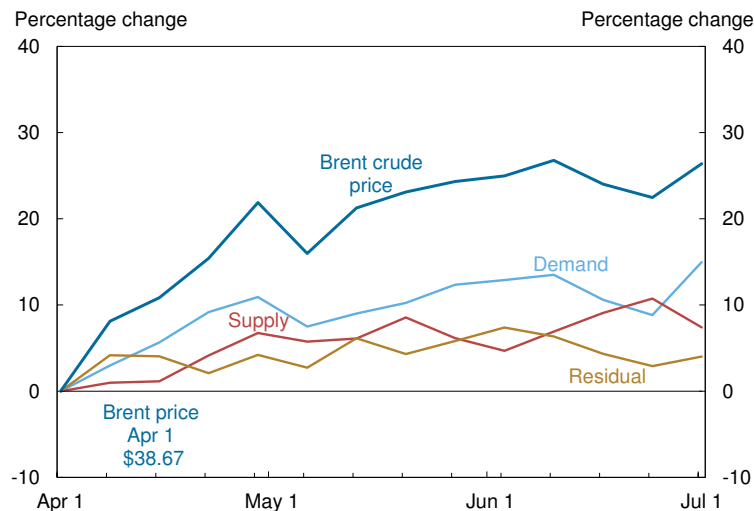
Updated: July 5, 2016

Over the past week, oil prices rose owing to increased demand expectations.

- Global demand expectations increased sharply over the past week, and, though partially offset by loosening supply conditions, resulted in an oil price increase. Since early 2016:Q2, reassessment of global demand expectations and tighter supply conditions have both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

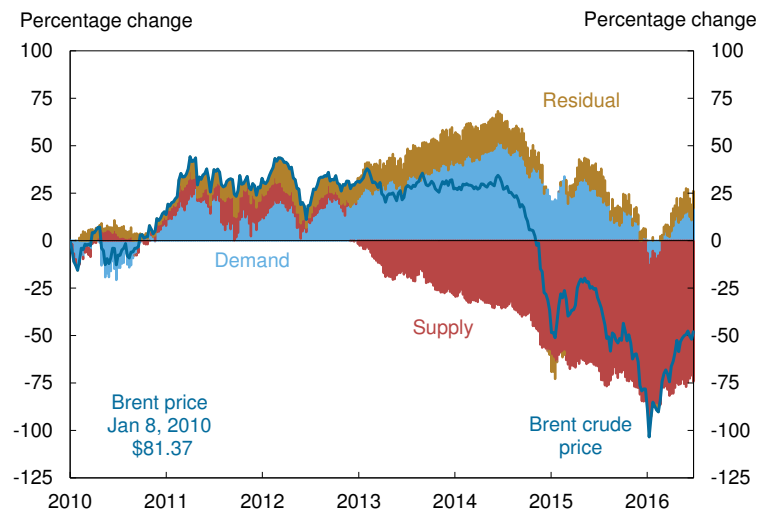
Cumulative Weekly Decomposition, Apr 01-Jul 01, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Jun 17, 2016	10.6	9.1	4.3	24.0
Jun 24, 2016	8.8	10.7	2.9	22.5
Jul 01, 2016	15.0	7.4	4.0	26.4

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

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Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

References

- Groen, J., and P. Russo. 2015. "Is Cheaper Oil Good News or Bad News for the U.S. Economy?" *Liberty Street Economics*, June 8.
- Groen, J., K. McNeil, and M. Middeldorp. 2013. "A New Approach for Identifying Demand and Supply Shocks in the Oil Market." *Liberty Street Economics*, March 25.

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OIL PRICE DYNAMICS REPORT

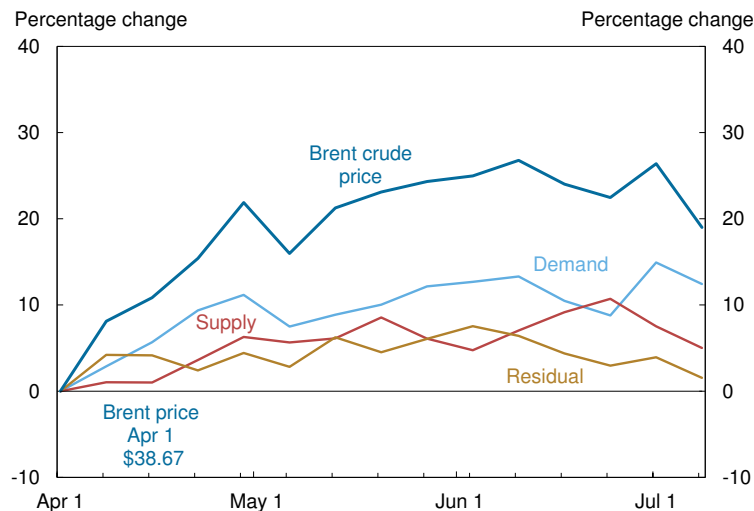
Updated: July 11, 2016

Over the past week, oil prices declined owing to decreased demand expectations and loosening supply conditions.

- Declining global demand expectations, combined with loosening supply conditions, resulted in a sharp Brent oil price decrease over the past week. Since early 2016:Q2, reassessment of global demand expectations and tighter supply conditions have both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Apr 01-Jul 08, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

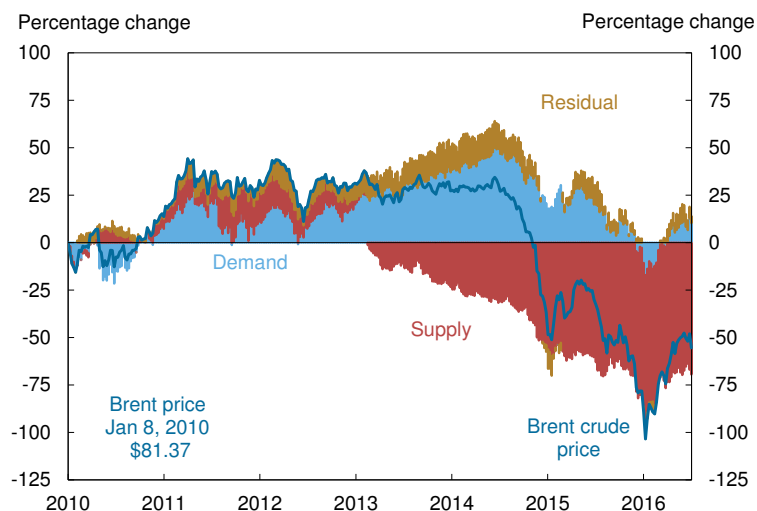
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Jun 24, 2016	8.8	10.7	3.0	22.5
Jul 01, 2016	14.9	7.5	3.9	26.4
Jul 08, 2016	12.4	5.0	1.5	19.0

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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Oil Price Decomposition Q&A

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Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

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- Groen, J., and P. Russo. 2015. "Is Cheaper Oil Good News or Bad News for the U.S. Economy?" *Liberty Street Economics*, June 8.
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OIL PRICE DYNAMICS REPORT

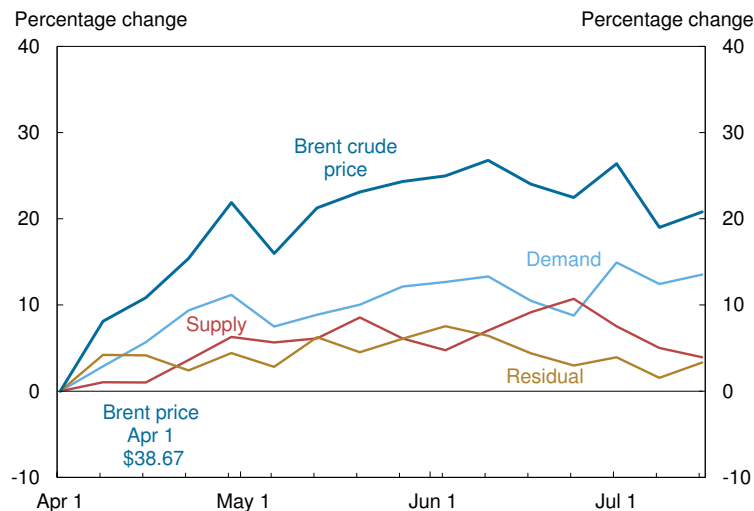
Updated: July 18, 2016

Oil prices climbed over the past week as demand expectations and the residual rose.

- Increased global demand expectations and a higher residual pushed oil prices up this week. Supply loosened for the third week in a row. Over 2016:Q2, reassessment of global demand expectations and tighter supply conditions have both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Apr 01-Jul 15, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

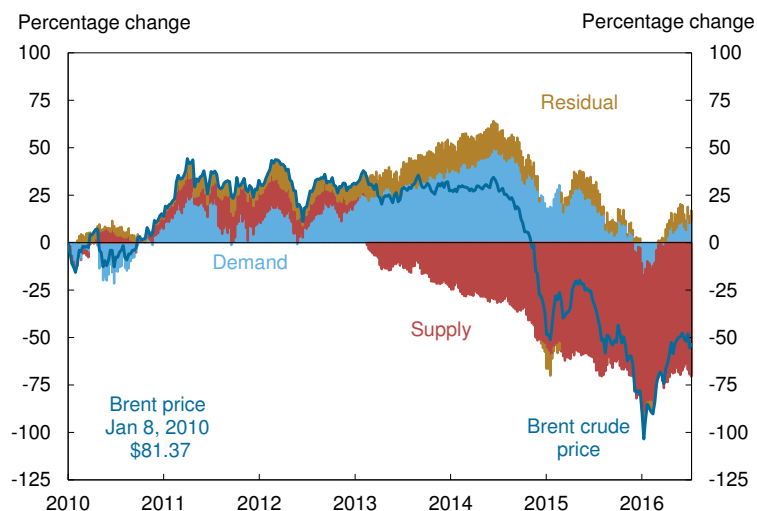
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Jul 01, 2016	14.9	7.5	3.9	26.4
Jul 08, 2016	12.4	5.0	1.5	19.0
Jul 15, 2016	13.5	3.9	3.3	20.8

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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- Groen, J., and P. Russo. 2015. "Is Cheaper Oil Good News or Bad News for the U.S. Economy?" *Liberty Street Economics*, June 8.
- Groen, J., K. McNeil, and M. Middeldorp. 2013. "A New Approach for Identifying Demand and Supply Shocks in the Oil Market." *Liberty Street Economics*, March 25.

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OIL PRICE DYNAMICS REPORT

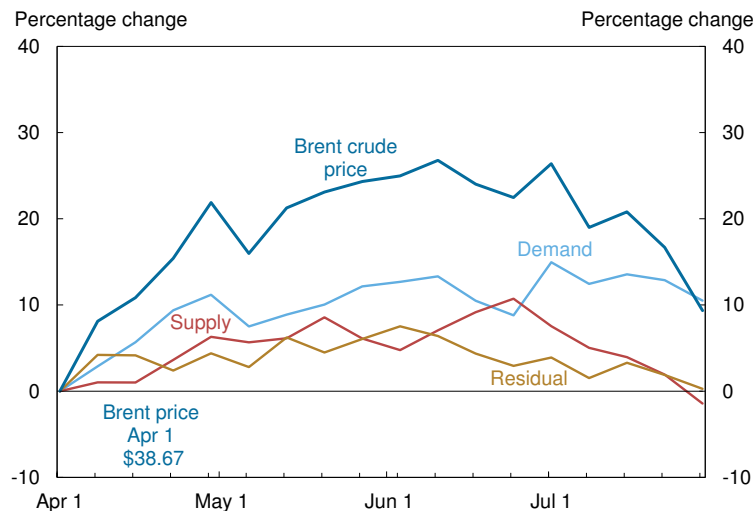
Updated: August 1, 2016

Oil prices fell in recent weeks owing to weaker demand and easing supply conditions.

- Over the past two weeks, gloomier global demand expectations and loosening supply led to a decrease in oil prices. Yet over 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that had been reversing since the end of 2016:Q1, but now seems to be reasserting itself again.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Apr 01-Jul 29, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

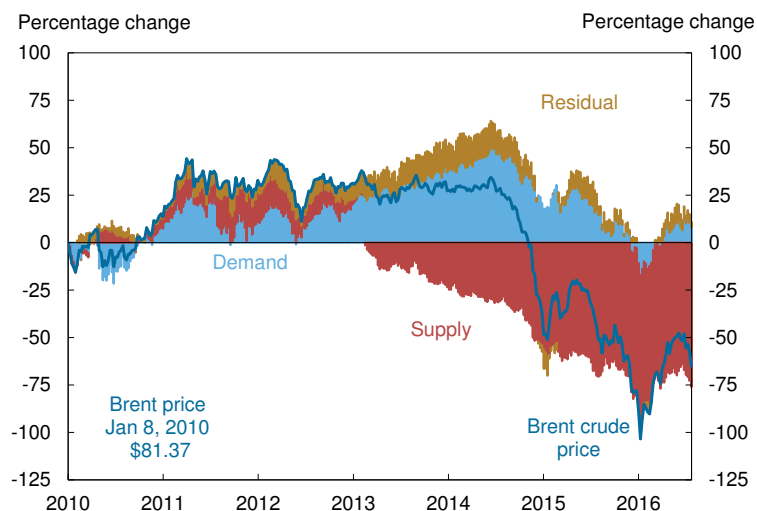
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Jul 15, 2016	13.6	3.9	3.3	20.8
Jul 22, 2016	12.9	1.9	1.9	16.7
Jul 29, 2016	10.5	-1.4	0.3	9.3

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics from mid-2014.

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- Groen, J., K. McNeil, and M. Middeldorp. 2013. "A New Approach for Identifying Demand and Supply Shocks in the Oil Market." *Liberty Street Economics*, March 25.

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OIL PRICE DYNAMICS REPORT

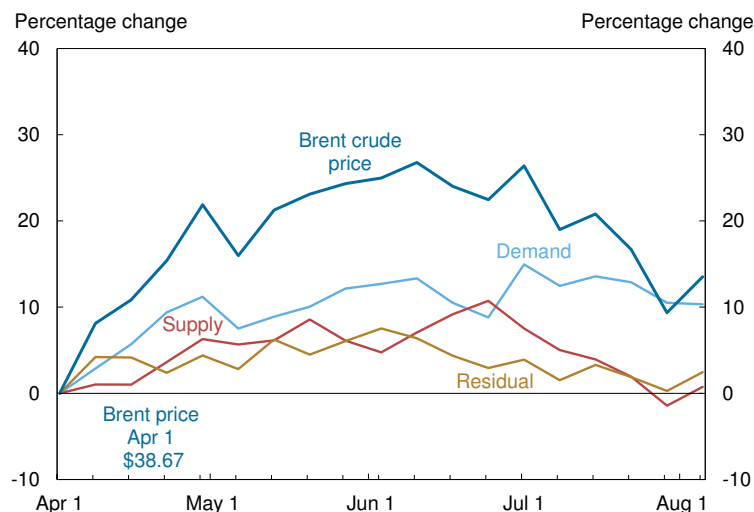
Updated: August 8, 2016

Oil prices recovered in response to stabilizing supply conditions and a larger residual.

- Perceived supply conditions tightened somewhat over the past week, ending the recent trend of supply expansion. This development, as well as an increase in the residual, led to higher oil prices. Over 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that had been reversing since the end of 2016:Q1, but now seems to be reasserting itself again.

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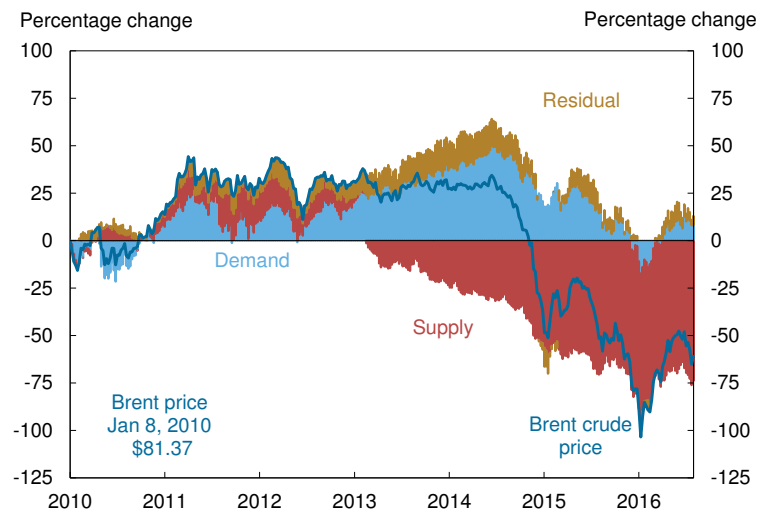
Cumulative Weekly Decomposition, Apr 01-Aug 05, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors.
Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Jul 22, 2016	12.9	1.9	1.9	16.7
Jul 29, 2016	10.5	-1.4	0.3	9.3
Aug 05, 2016	10.3	0.7	2.5	13.5

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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OIL PRICE DYNAMICS REPORT

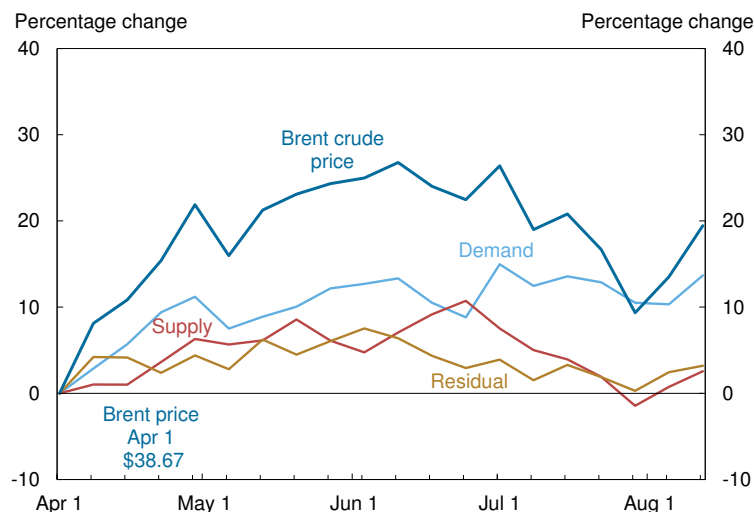
Updated: August 15, 2016

Oil prices continued their increases owing to tighter supply and improving demand.

- Over the past week oil prices were again higher, as demand expectations improved and perceived supply conditions continued to tighten. In 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that had been reversing since the end of 2016:Q1.

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Cumulative Weekly Decomposition, Apr 01-Aug 12, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

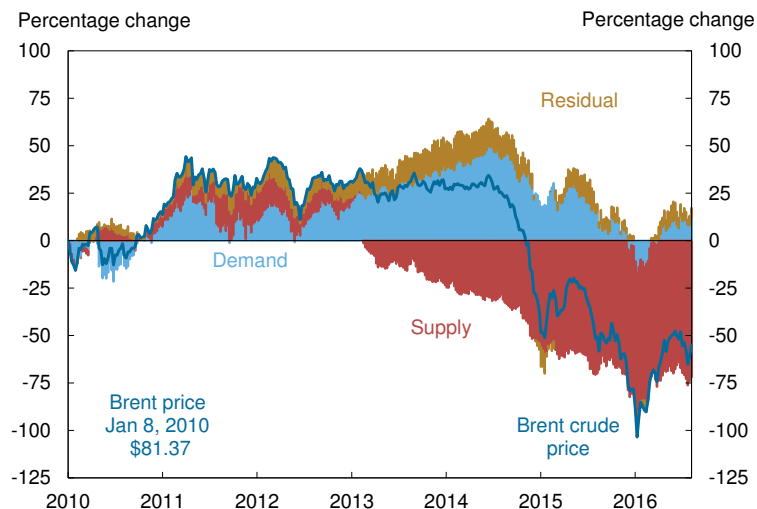
Recent Decomposition Data

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- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Jul 29, 2016	10.5	-1.4	0.3	9.3
Aug 05, 2016	10.3	0.7	2.5	13.5
Aug 12, 2016	13.7	2.6	3.2	19.4

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

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Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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Authors

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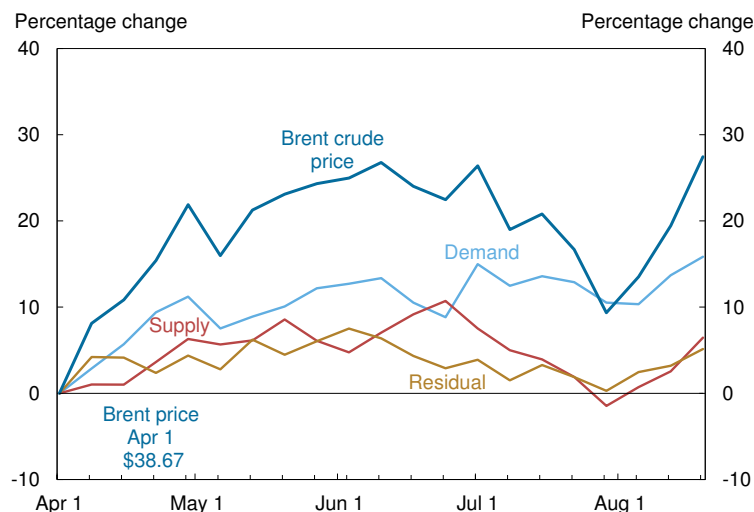
Updated: August 22, 2016

Tighter supply conditions again push up oil prices.

- The principal driver of higher oil prices this week was the tightening of perceived supply conditions, although improving demand provided some additional impetus. In 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

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Cumulative Weekly Decomposition, Apr 01-Aug 19, 2016



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Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

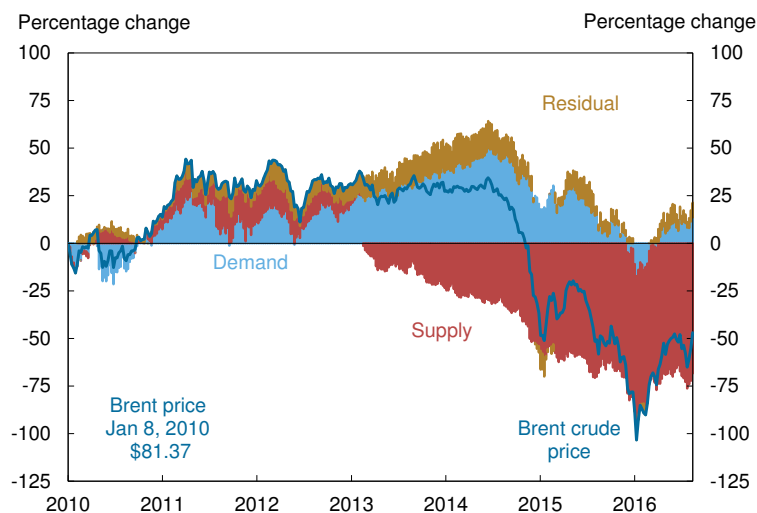
Recent Decomposition Data

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Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Aug 05, 2016	10.3	0.7	2.5	13.5
Aug 12, 2016	13.7	2.5	3.2	19.4
Aug 19, 2016	15.8	6.5	5.1	27.4

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

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Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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Oil Price Decomposition Q&A

1) What is the goal of the oil price decomposition?

Our aim is to determine how much of the observed oil price change has been driven by demand and supply factors.

2) What is the modeling strategy?

Using a statistical model and a large number of financial variables, we decompose weekly oil price changes into demand effects, supply effects, and an unexplained residual.

Sparse partial least squares regression allows us to construct linear combinations from the variables in our financial market data set—called factors—which have maximum explanatory content for oil price changes. We first use this procedure to generate factors that best capture the patterns in the data, and then examine the estimated factors to determine how they reflect demand or supply dynamics.

The model is re-estimated every week using weekly data from January 1986 through the close of business on Friday of the most recent week. Over this sample, the model can explain about two-thirds of the weekly oil price dynamics.

3) How to interpret the results?

The output of the model is used to decompose weekly changes in an accounting sense. More specifically, the weekly Brent crude price change always equals the change explained by demand factors plus the change explained by supply factors plus a residual (the weekly change unexplained by the sum of the estimated demand and supply factors).

Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

References

- *Groen, J., and P. Russo.* 2015. “Is Cheaper Oil Good News or Bad News for the U.S. Economy?” *Liberty Street Economics*, June 8.
- *Groen, J., K. McNeil, and M. Middeldorp.* 2013. “A New Approach for Identifying Demand and Supply Shocks in the Oil Market.” *Liberty Street Economics*, March 25.

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OIL PRICE DYNAMICS REPORT

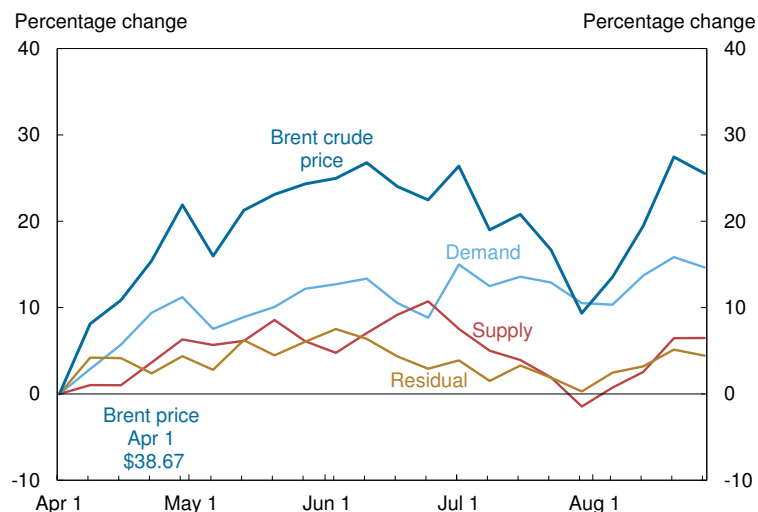
Updated: August 29, 2016

Decreasing demand led to somewhat lower oil prices.

- Anticipated global demand declined slightly over the past week, which led to modestly lower oil prices since perceived supply barely changed. In 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Apr 01-Aug 26, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

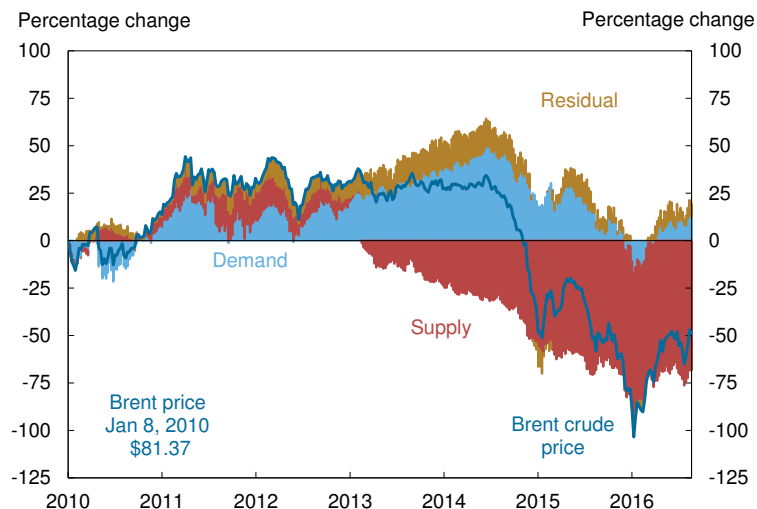
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Aug 12, 2016	13.7	2.5	3.2	19.4
Aug 19, 2016	15.8	6.5	5.1	27.4
Aug 26, 2016	14.6	6.5	4.4	25.5

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

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Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics after mid-2014.

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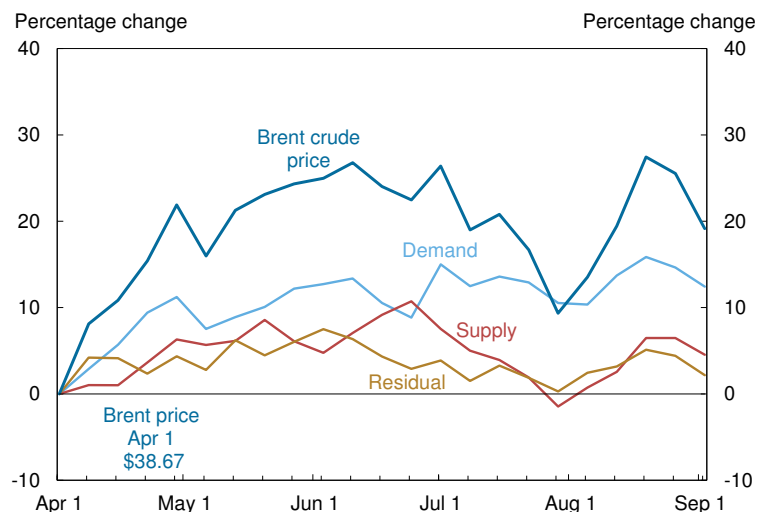
Updated: September 6, 2016

Oil prices continue to fall owing to lower demand and expanding supply.

- Oil prices fell again over the past week, at an accelerated pace relative to the previous week. This price decrease stemmed more or less equally from declining anticipated global demand, larger perceived supply, and a lower residual. In 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1, but now seems to be reasserting itself again.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Apr 01-Sep 02, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

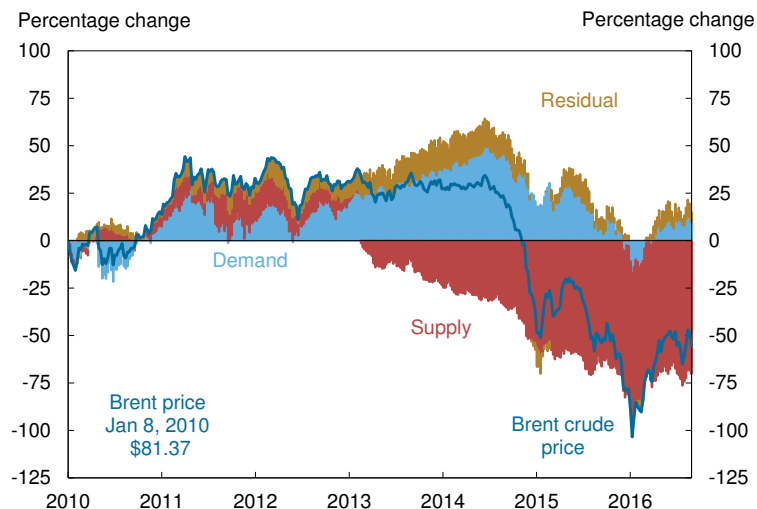
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Aug 19, 2016	15.9	6.5	5.1	27.4
Aug 26, 2016	14.6	6.5	4.4	25.5
Sep 02, 2016	12.4	4.5	2.2	19.1

Cumulative Weekly Decomposition, 2010-16



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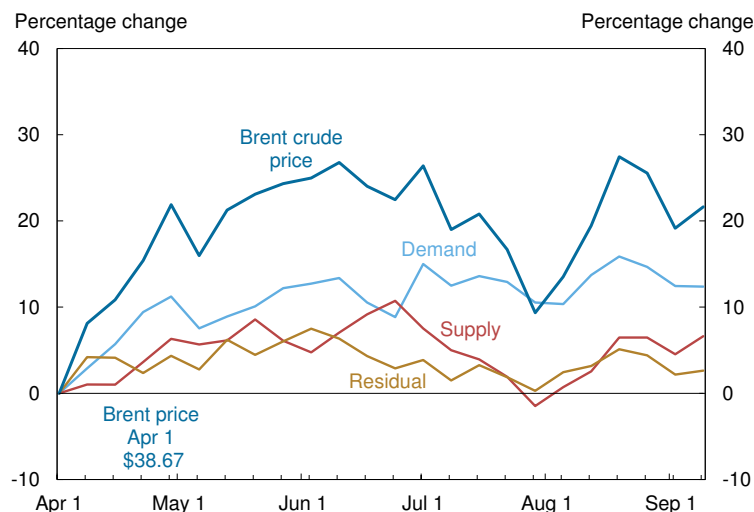
Updated: September 12, 2016

Decreasing oil supply expectations resulted in higher oil prices.

- Oil prices rose over the past week, after the price declines seen in the two previous weeks. The price increase was almost solely driven by lower perceived supply. In 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

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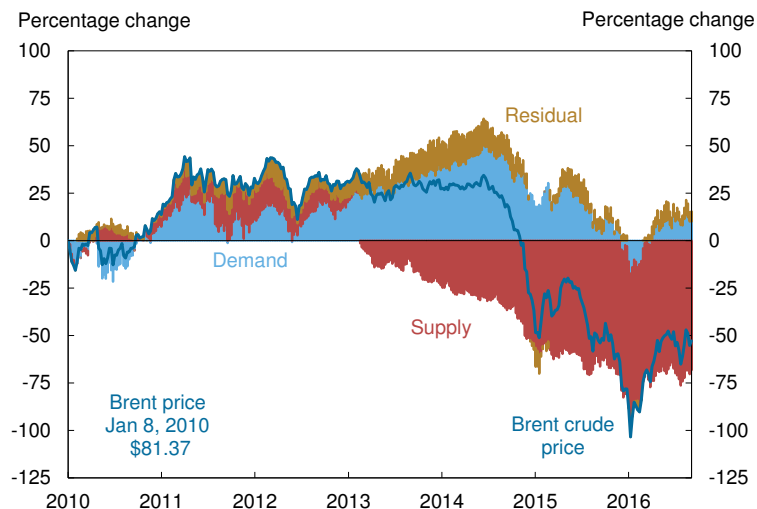
Cumulative Weekly Decomposition, Apr 01-Sep 09, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

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Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Aug 26, 2016	14.7	6.5	4.4	25.5
Sep 02, 2016	12.4	4.5	2.2	19.1
Sep 09, 2016	12.4	6.6	2.6	21.6

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics after mid-2014.

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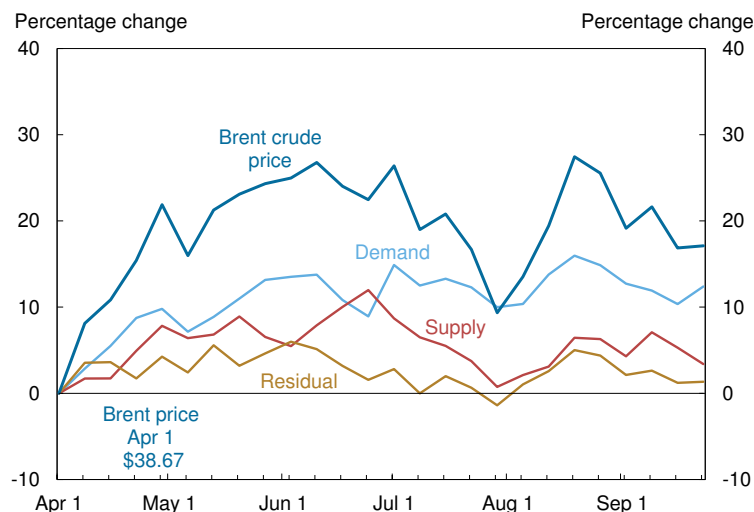
Updated: September 26, 2016

On balance, oil prices declined over the past two weeks, mostly as a result of expanding supply.

- Oil prices were broadly unchanged over the past week, with the price impact of increased perceived supply countered by improving global demand expectations. In contrast, oil prices fell in the previous week, owing to growing supply and declining demand. In 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

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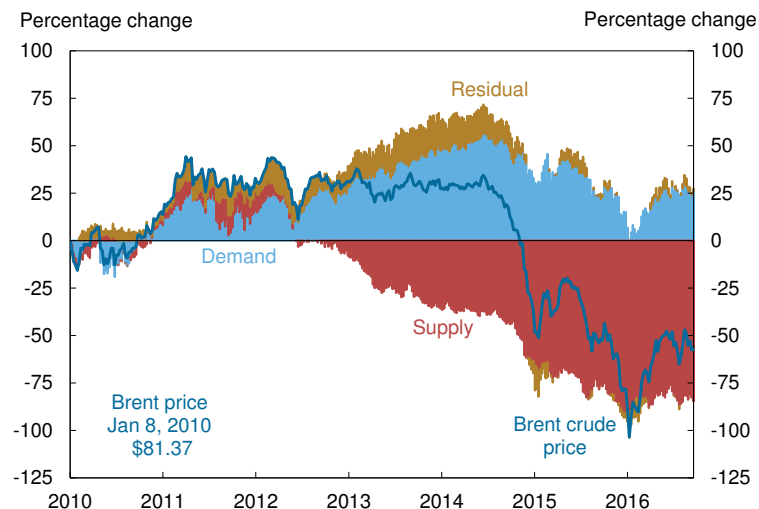
Cumulative Weekly Decomposition, Apr 01-Sep 23, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors.
Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Sep 09, 2016	11.9	7.1	2.6	21.6
Sep 16, 2016	10.3	5.3	1.2	16.9
Sep 23, 2016	12.4	3.4	1.3	17.1

Longer-Term View of Oil Price Movements

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OIL PRICE DYNAMICS REPORT

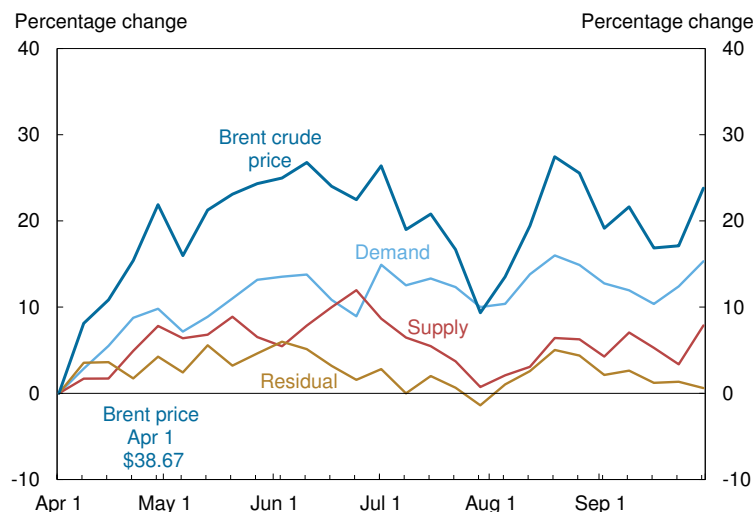
Updated: October 3, 2016

Oil prices moved up over the past week, owing to stronger demand and tighter supply.

- Oil prices increased over the past week, driven by continuing improvement in global demand expectations as well as tightening in perceived supply following OPEC's production cut deal. In 2016:Q2, reassessment of global demand expectations and tighter supply conditions both exerted upward pressure on oil prices.
- These developments follow the temporary demand-driven oil price weakness of early Q1. Tighter supply conditions, however, exerted upward pressure during this period, leaving oil prices up modestly.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that has been reversing since the end of 2016:Q1.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Apr 01-Sep 30, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

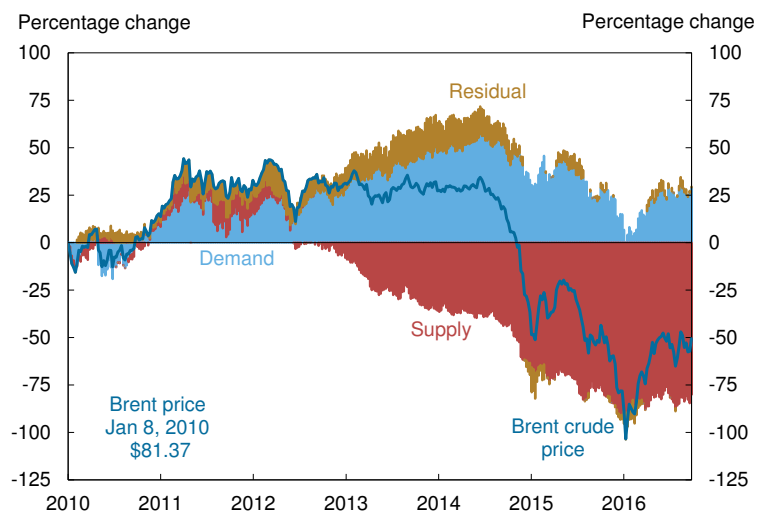
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from April 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since April 1, 2016

	Demand	Supply	Rest	Brent
Sep 16, 2016	10.4	5.3	1.2	16.9
Sep 23, 2016	12.4	3.4	1.3	17.1
Sep 30, 2016	15.3	7.9	0.6	23.8

Cumulative Weekly Decomposition, 2010-16



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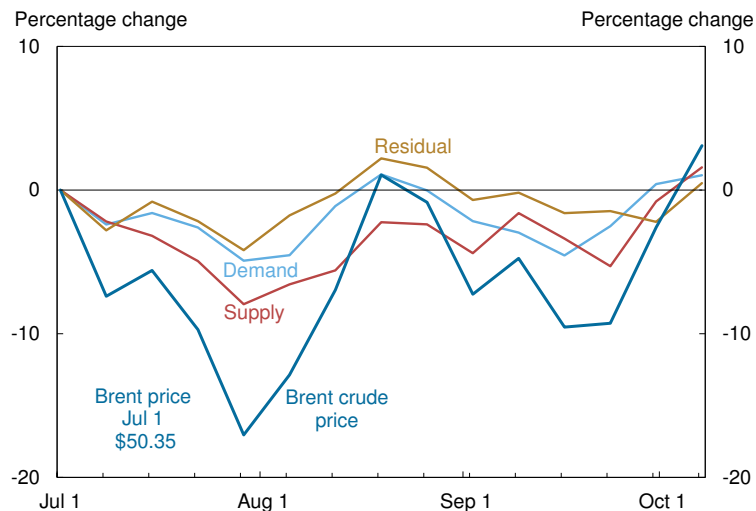
Updated: October 11, 2016

Tighter supply led to higher oil prices over the past week.

- Oil prices again increased over the past week, this time largely owing to supply conditions perceived as tightening. For 2016:Q3, oil prices were somewhat down as a result of a volatile weakening of global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Jul 01-Oct 07, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

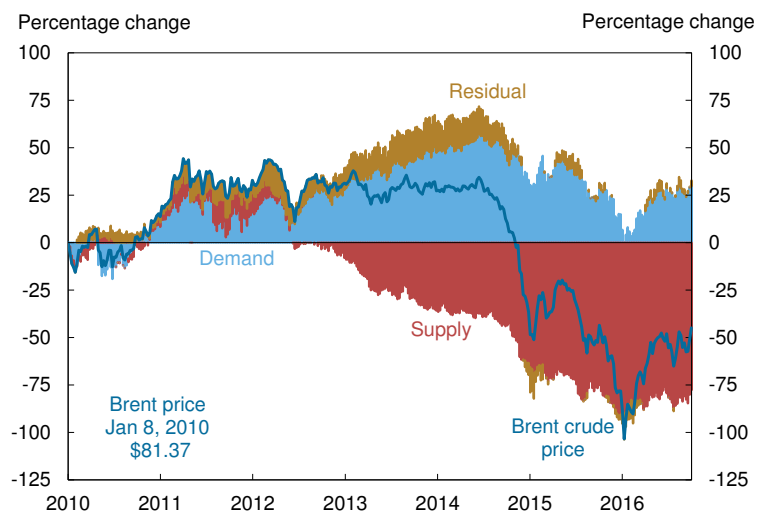
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from July 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Sep 23, 2016	-2.5	-5.3	-1.5	-9.3
Sep 30, 2016	0.4	-0.8	-2.2	-2.6
Oct 07, 2016	1.0	1.6	0.5	3.1

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
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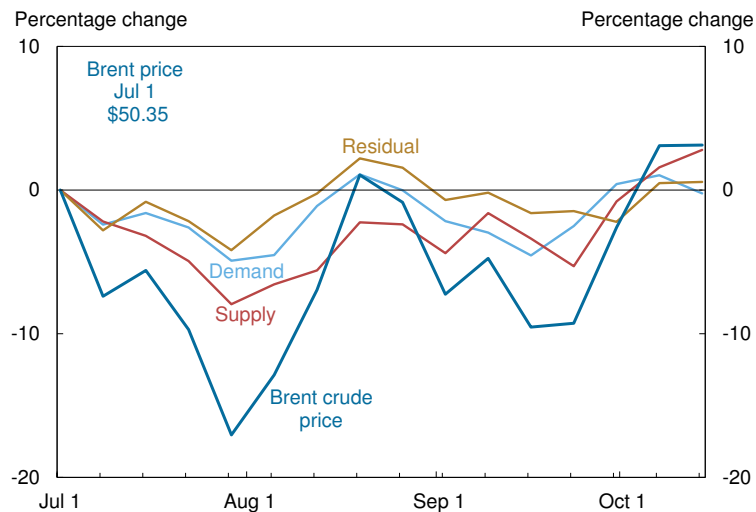
Updated: October 17, 2016

Oil prices were broadly unchanged over the past week owing to tighter supply and declining demand.

- As in previous weeks, supply conditions continued to be perceived as tightening over the past week, but global demand expectations deteriorated. Because of these offsetting developments, oil prices remained essentially stable over the period. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

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Cumulative Weekly Decomposition, Jul 01-Oct 14, 2016



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 Supply, demand, and residual sum to Brent crude price.

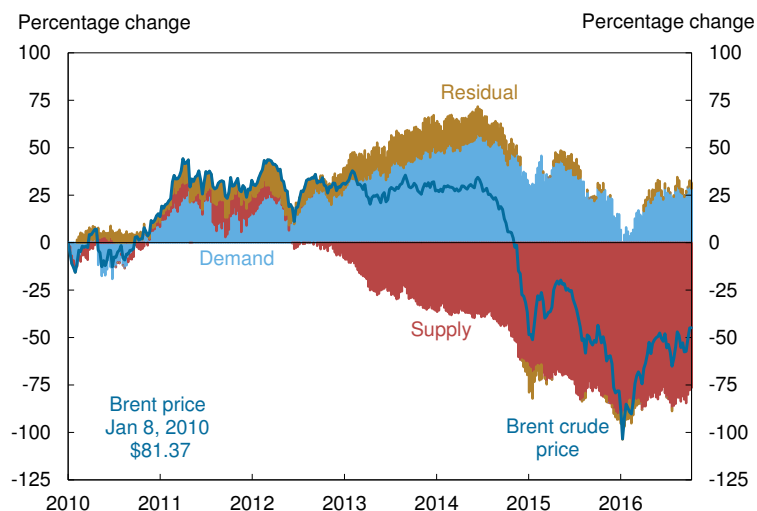
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Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Sep 30, 2016	0.4	-0.8	-2.2	-2.6
Oct 07, 2016	1.0	1.6	0.5	3.1
Oct 14, 2016	-0.2	2.8	0.6	3.1

Cumulative Weekly Decomposition, 2010-16



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The model is re-estimated every week using weekly data from January 1986 through the close of business on Friday of the most recent week. Over this sample, the model can explain about two-thirds of the weekly oil price dynamics.

3) How to interpret the results?

The output of the model is used to decompose weekly changes in an accounting sense. More specifically, the weekly Brent crude price change always equals the change explained by demand factors plus the change explained by supply factors plus a residual (the weekly change unexplained by the sum of the estimated demand and supply factors).

Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

References

- *Groen, J., and P. Russo.* 2015. “Is Cheaper Oil Good News or Bad News for the U.S. Economy?” *Liberty Street Economics*, June 8.
- *Groen, J., K. McNeil, and M. Middeldorp.* 2013. “A New Approach for Identifying Demand and Supply Shocks in the Oil Market.” *Liberty Street Economics*, March 25.

Authors

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OIL PRICE DYNAMICS REPORT

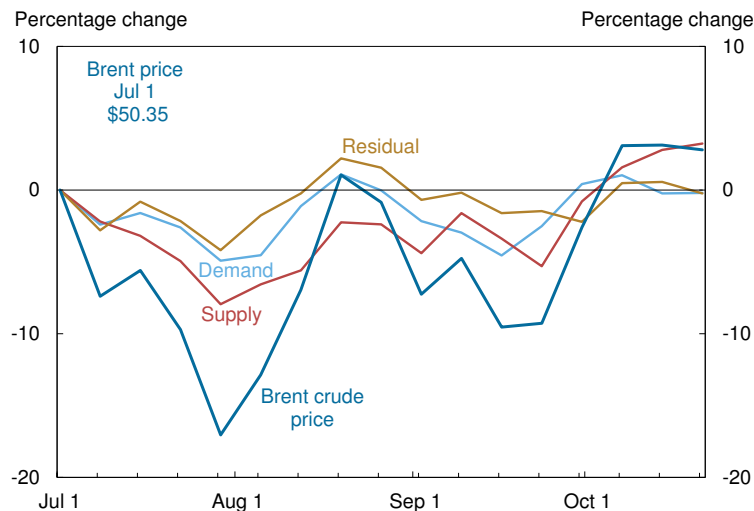
Updated: October 24, 2016

Despite a somewhat tighter supply, oil prices remained broadly stable over the past week.

- Supply conditions continued to be perceived as tightening over the past week, albeit at a much slower pace than in the preceding weeks. Global demand expectations were unchanged over the week, whereas the residual fell. As a result of these offsetting developments, oil prices remained, for a second consecutive week, essentially unchanged. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Jul 01-Oct 21, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

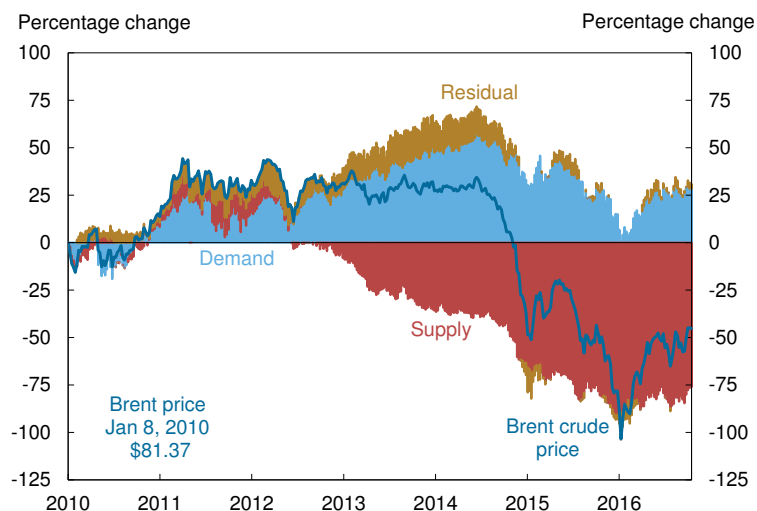
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from July 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Oct 07, 2016	1.0	1.6	0.5	3.1
Oct 14, 2016	-0.2	2.8	0.6	3.1
Oct 21, 2016	-0.2	3.2	-0.2	2.8

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics after mid-2014.

Oil Price Decomposition Q&A

1) What is the goal of the oil price decomposition?

Our aim is to determine how much of the observed oil price change has been driven by demand and supply factors.

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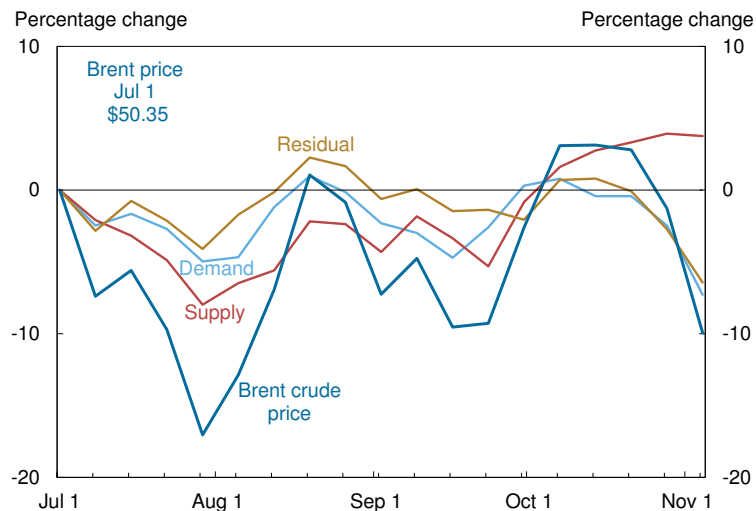
Updated: November 7, 2016

Decreased demand expectations pushed down oil prices.

- While perceived supply conditions increased only slightly over the past two weeks, global demand expectations fell sharply along with the residual, leading to a decline in oil prices in this period. For 2016:Q3, oil prices were somewhat lower as a result of weakening albeit volatile global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

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Cumulative Weekly Decomposition, Jul 01-Nov 04, 2016



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Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

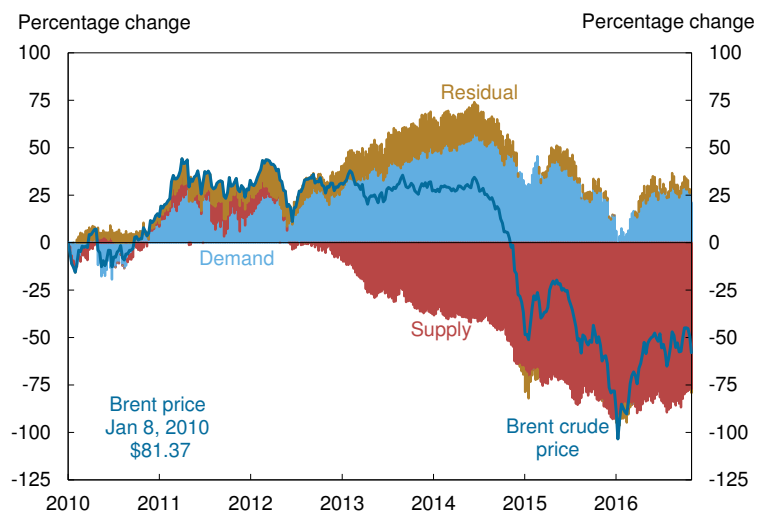
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from July 1, 2016.
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Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Oct 21, 2016	-0.4	3.3	-0.1	2.8
Oct 28, 2016	-2.5	3.9	-2.7	-1.3
Nov 04, 2016	-7.3	3.8	-6.4	-10.0

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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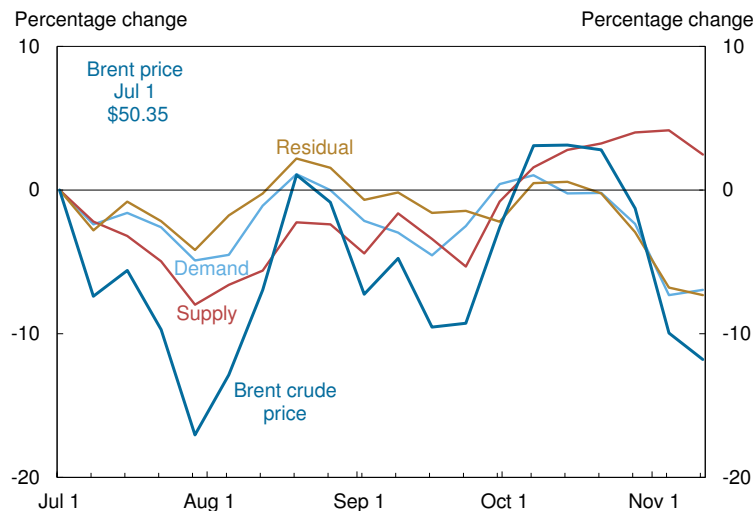
Updated: November 14, 2016

Expanding supply conditions over the past week pushed down oil prices.

- While demand expectations increased slightly over the past week, pressure from a perceived increase in supply resulted in a net decline in oil prices. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

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Cumulative Weekly Decomposition, Jul 01-Nov 11, 2016



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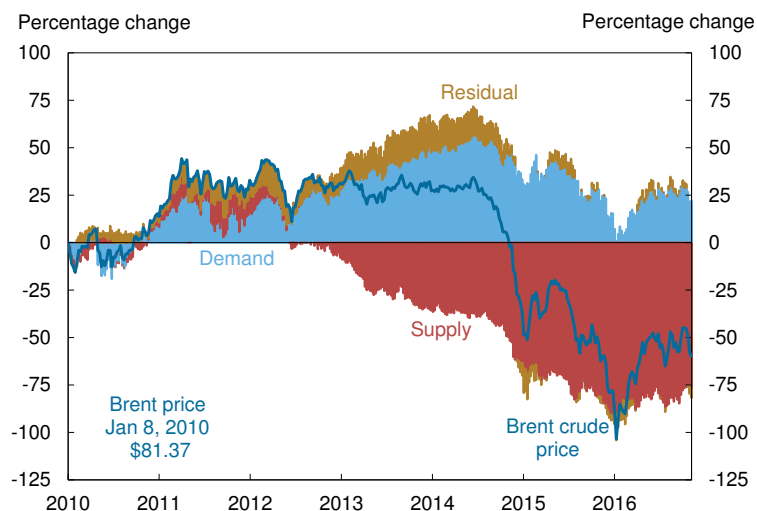
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from July 1, 2016.
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Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Oct 28, 2016	-2.4	4.0	-2.9	-1.3
Nov 04, 2016	-7.3	4.2	-6.8	-10.0
Nov 11, 2016	-6.9	2.5	-7.3	-11.8

Cumulative Weekly Decomposition, 2010-16



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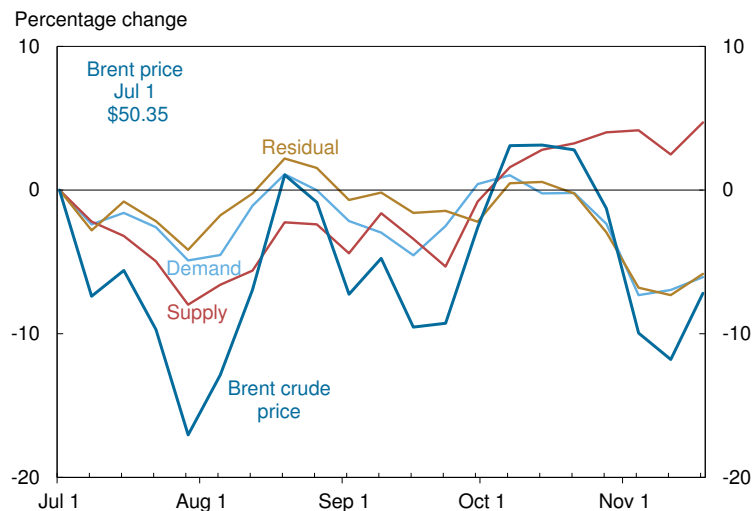
Updated: November 21, 2016

Oil prices increased over the past week, mostly as a result of tightening supply.

- Over the past week, oil prices rose owing to a perceived decline in supply alongside a slight increase in demand expectations. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

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Cumulative Weekly Decomposition, Jul 01-Nov 18, 2016



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Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

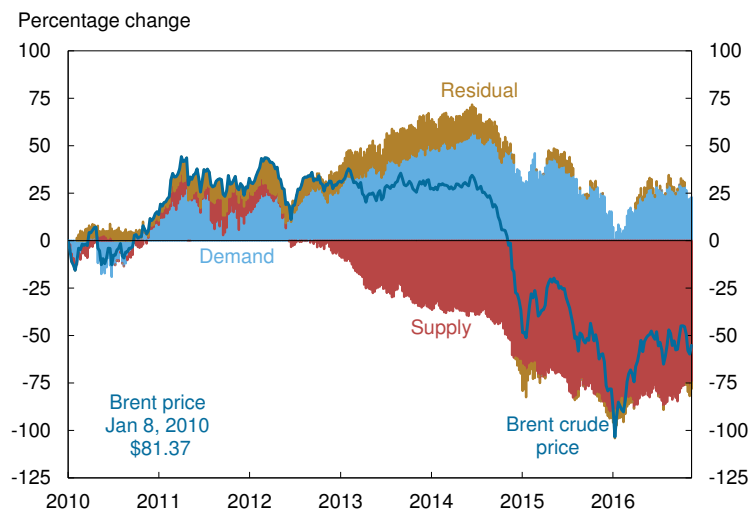
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from July 1, 2016.
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Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Nov 04, 2016	-7.3	4.2	-6.8	-10.0
Nov 11, 2016	-7.0	2.5	-7.3	-11.8
Nov 18, 2016	-6.1	4.7	-5.8	-7.2

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
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- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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OIL PRICE DYNAMICS REPORT

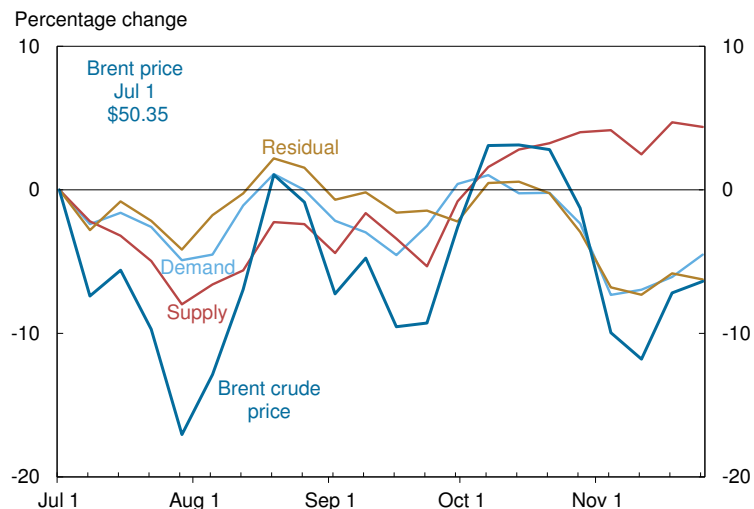
Updated: November 28, 2016

Oil prices went up owing to increased demand expectations.

- Over the past week, oil prices rose following an increase in expected demand, which was only slightly offset by a perceived loosening in supply and a declining residual. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

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Cumulative Weekly Decomposition, Jul 01-Nov 25, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

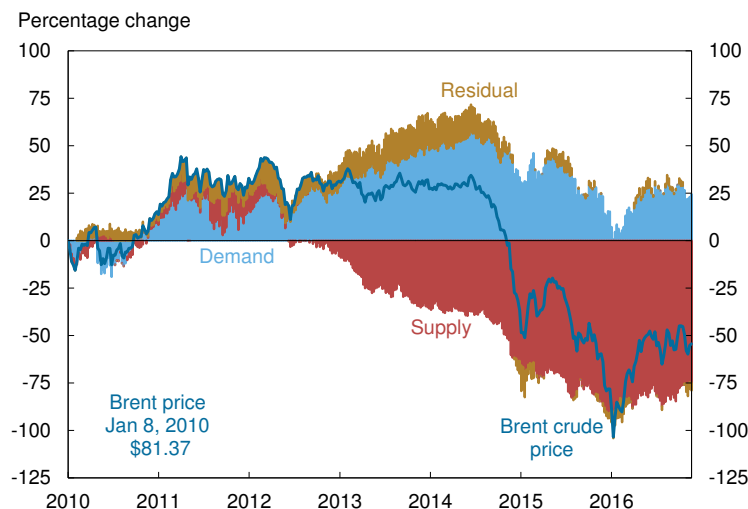
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from July 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Nov 11, 2016	-7.0	2.5	-7.3	-11.8
Nov 18, 2016	-6.1	4.7	-5.8	-7.2
Nov 25, 2016	-4.5	4.4	-6.2	-6.4

Cumulative Weekly Decomposition, 2010-16



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Longer-Term View of Oil Price Movements

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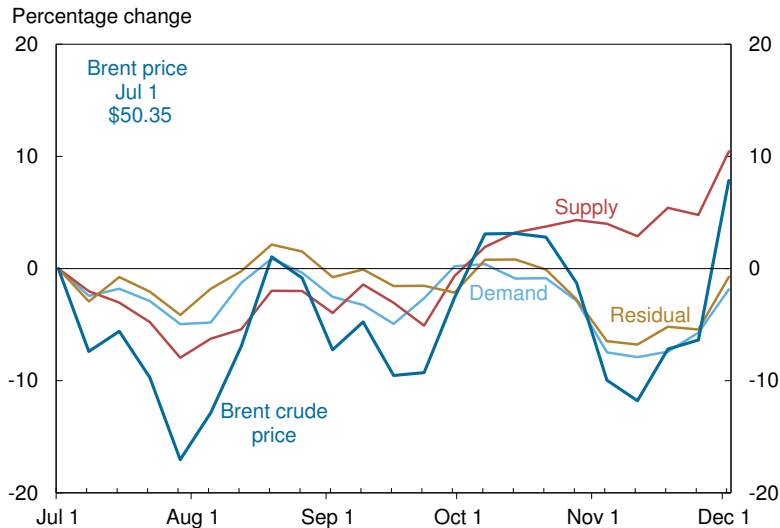
Updated: December 5, 2016

Oil prices increased sharply owing to tightening supply and strengthening demand.

- A large perceived decline in supply following an extensive OPEC production cut deal on November 30 alongside a surge in demand expectations drove a spike in oil prices over the past week. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

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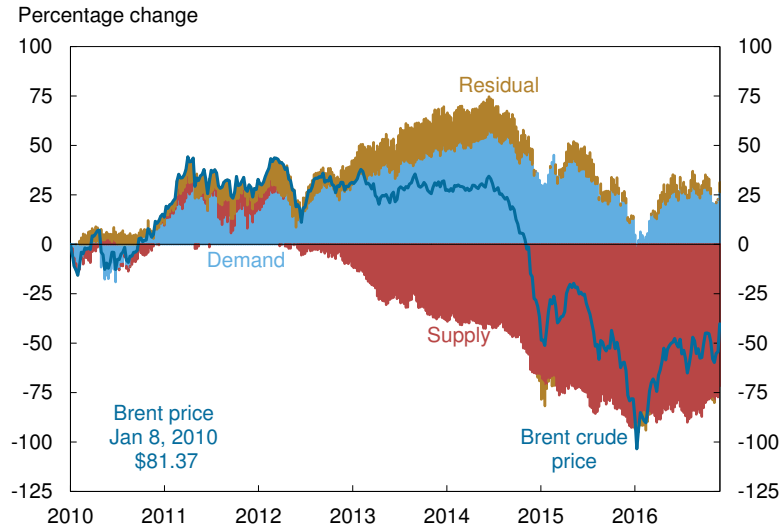
Cumulative Weekly Decomposition, Jul 01-Dec 02, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

Notes: Residual reflects price movements unexplained by supply and demand factors. Supply, demand, and residual sum to Brent crude price.

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.

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Recent Decomposition Data

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Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Nov 18, 2016	-7.4	5.4	-5.2	-7.2
Nov 25, 2016	-5.7	4.8	-5.4	-6.4
Dec 02, 2016	-1.9	10.4	-0.7	7.8

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
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References

- Groen, J., and P. Russo. 2016. “Lower Oil Prices and U.S. Economic Activity.” *Liberty Street Economics*, May 2.
- Groen, J., and P. Russo. 2015. “Is Cheaper Oil Good News or Bad News for the U.S. Economy?” *Liberty Street Economics*, June 8.
- Groen, J., K. McNeil, and M. Middeldorp. 2013. “A New Approach for Identifying Demand and Supply Shocks in the Oil Market.” *Liberty Street Economics*, March 25.

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OIL PRICE DYNAMICS REPORT

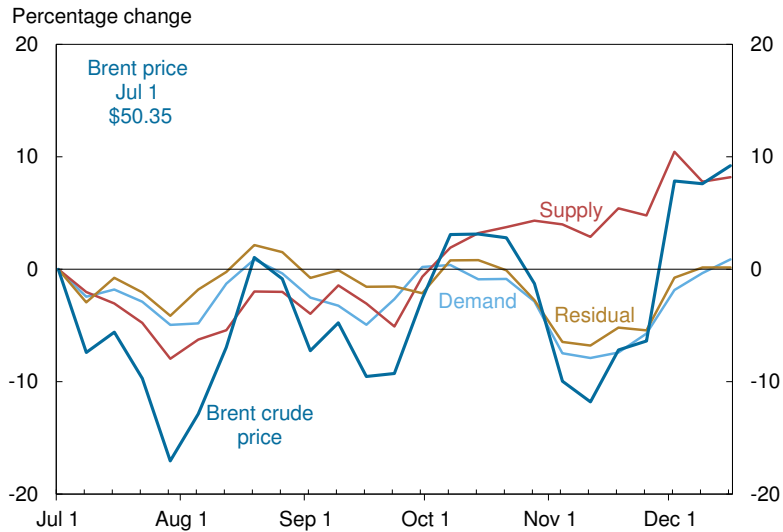
Updated: December 19, 2016

Oil prices increased slightly owing to strengthening demand.

- Despite supply conditions expanding on net over the past two weeks, demand expectations steadily improved, leading to an increase in oil prices over this horizon. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

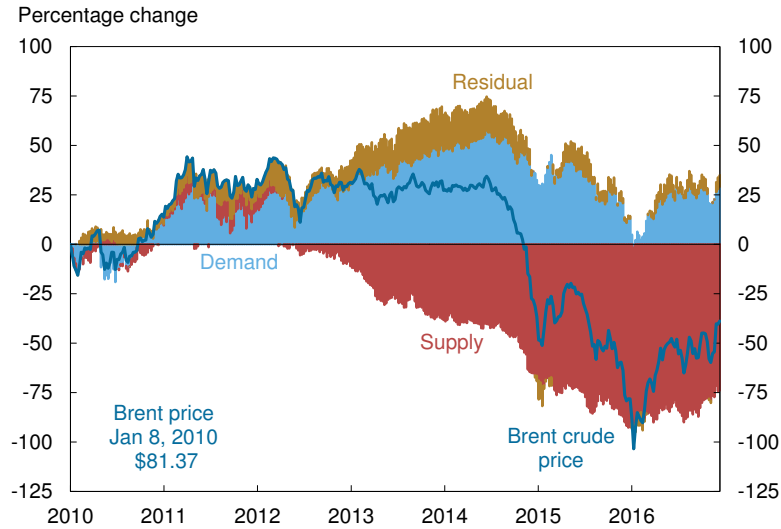
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Cumulative Weekly Decomposition, Jul 01-Dec 16, 2016



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Cumulative Weekly Decomposition, 2010-16



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Recent Decomposition Data

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	Demand	Supply	Rest	Brent
Dec 02, 2016	-1.9	10.4	-0.8	7.8
Dec 09, 2016	-0.3	7.8	0.2	7.6
Dec 16, 2016	0.9	8.2	0.2	9.2

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The model is re-estimated every week using weekly data from January 1986 through the close of business on Friday of the most recent week. Over this sample, the model can explain about two-thirds of the weekly oil price dynamics.

3. How to interpret the results?

The output of the model is used to decompose weekly changes in an accounting sense. More specifically, the weekly Brent crude price change always equals the change explained by demand factors plus the change explained by supply factors plus a residual (the weekly change unexplained by the sum of the estimated demand and supply factors).

Given the noise in weekly price changes, we choose to show the results as a cumulation from a certain starting point (usually the start of the previous quarter).

References

- Groen, J., and P. Russo. 2016. “Lower Oil Prices and U.S. Economic Activity.” *Liberty Street Economics*, May 2.
- Groen, J., and P. Russo. 2015. “Is Cheaper Oil Good News or Bad News for the U.S. Economy?” *Liberty Street Economics*, June 8.
- Groen, J., K. McNeil, and M. Middeldorp. 2013. “A New Approach for Identifying Demand and Supply Shocks in the Oil Market.” *Liberty Street Economics*, March 25.

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OIL PRICE DYNAMICS REPORT

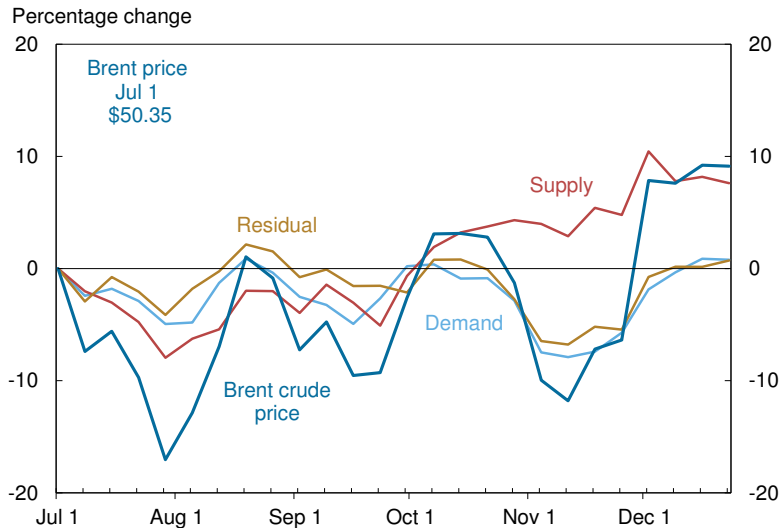
Updated: December 27, 2016

Oil prices were broadly unchanged as a loosening supply was offset by a higher residual.

- A modest perceived increase in supply, in combination with essentially unchanged global demand expectations and a somewhat higher residual, kept oil prices broadly unchanged over the past week. For 2016:Q3, oil prices were somewhat lower as a result of volatile but weakening global demand expectations as well as looser supply conditions.
- These developments follow the rebound in oil prices in Q2. Upward price pressure from both tighter supply conditions and more upbeat global demand expectations drove this bounce-back.
- Overall, since the end of 2014:Q2, both lower global demand expectations and looser supply have held oil prices down—a trend that appeared to have reversed in 2016:Q2, but reemerged in 2016:Q3.

Our analysis of oil price movements does not necessarily represent the views of the Federal Reserve Bank of New York, the Federal Reserve System, or the Federal Open Market Committee.

Cumulative Weekly Decomposition, Jul 01-Dec 23, 2016



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

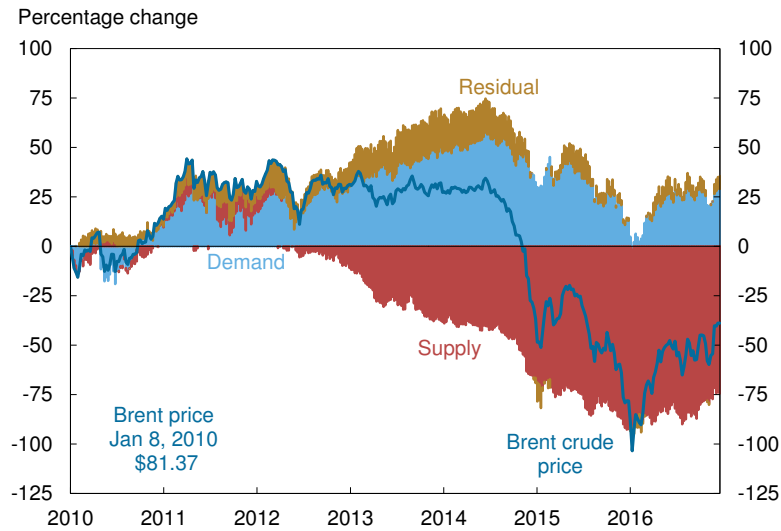
Recent Decomposition Data

- The chart at left depicts the cumulative oil price decomposition from July 1, 2016.
- The table below presents the most recent cumulative values.

Cumulative Percentage Changes since July 1, 2016

	Demand	Supply	Rest	Brent
Dec 09, 2016	-0.3	7.8	0.2	7.6
Dec 16, 2016	0.9	8.2	0.2	9.2
Dec 23, 2016	0.8	7.6	0.7	9.1

Cumulative Weekly Decomposition, 2010-16



Sources: Authors' calculations; Haver Analytics; Thomson Reuters; Bloomberg.
 Notes: Residual reflects price movements unexplained by supply and demand factors.
 Supply, demand, and residual sum to Brent crude price.

Longer-Term View of Oil Price Movements

- This final chart provides a somewhat longer-term perspective by means of a cumulative decomposition from 2010 onward.
- The analysis shows that excess supply became a significant driver of oil prices in mid-2012 and generally dominated price dynamics after mid-2014.

Oil Price Decomposition Q&A

1. What is the goal of the oil price decomposition?

Our aim is to determine how much of the observed oil price change has been driven by demand and supply factors.

2. What is the modeling strategy?

Using a statistical model and a large number of financial variables, we decompose weekly oil price changes into demand effects, supply effects, and an unexplained residual.

Sparse partial least squares regression allows us to construct linear combinations from the variables in our financial market data set—called factors—which have maximum explanatory content for oil price changes. We first use this procedure to generate factors that best capture the patterns in the data, and then examine the estimated factors to determine how they reflect demand or supply dynamics.

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