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Impact of Hurricane Harvey

August 29, 2017

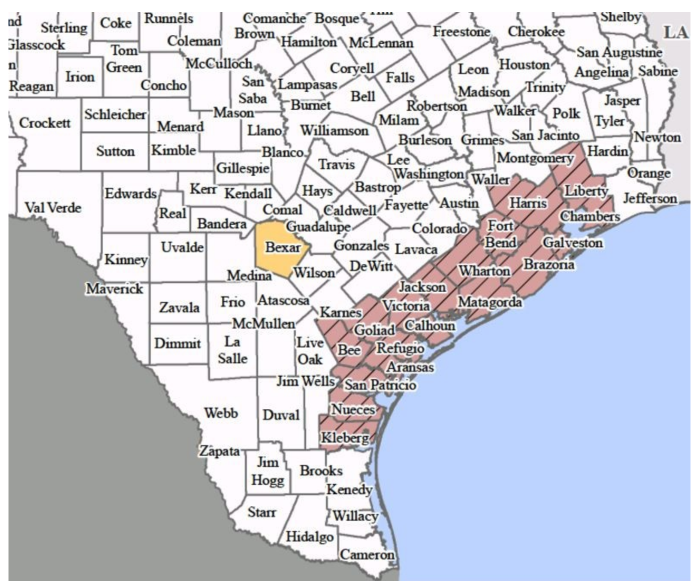
What's your estimate of the effect of Hurricane Harvey on third-quarter GDP growth, employment, and inflation?

The estimated impact on Q3 GDP growth is subject to a high degree of uncertainly, but we think a reasonable range is a subtraction of between 0.3 percentage point and 1.2 percentage points. August payroll employment will not be affected, and we are inclined to think September payrolls are likely to be only modestly affected. With respect to inflation, gasoline price futures have increased only modestly, though the effects could intensify.

Hurricane Harvey first made landfall on the Texas coast Friday evening as a Category 4 hurricane. Harvey has brought with it damaging winds, record rainfall, and devastating flooding. To date, FEMA has declared major disasters in 19 counties along the Gulf Coast and inland. The hit to GDP will reflect reduced output in directly affected areas and *increased* output resulting from preparations and recovery.[1] In what follows, we estimate these countervailing effects. We conclude that third-quarter GDP growth will be reduced between three-tenths and 1.2 percentage points due to Harvey. Furthermore, because of the timing, August payrolls will not be effected, and September payrolls are likely to be only modestly affected. Finally, futures markets anticipate only a modest impact on gasoline prices.

GDP Impact

The direct economic impact of Harvey comprises reduced production in affected areas during the duration of the storm and in the aftermath, as damage to infrastructure and flooding hampers productive activity. In what follows, we develop both a low and a high estimate of the impact on Q3 GDP growth. We use FEMA disaster declarations by county to determine the geographic scope of the direct impact, and we use BEA data on personal income by county to begin determining the size of the GDP effects.[2] At the time of this writing, FEMA had declared major disasters in 19 Texas counties. The image below is from FEMA and shows as shaded the counties for which a major disaster has been declared. In 2015, these 19 counties accounted for about 3% of nationwide personal income (see line 1 of the nearby table).[3]



[1] Changes to the National Accounts over the last several years have removed what used to be large, discrete adjustments on the income-side of the accounts stemming from natural disasters. The GDP effect will be limited solely to the direct and indirect effects on current production. See BEA's FAQ on this matter for a detailed discussion: http://www.bea.gov/faq/index.cfm?faq_id=1013.

[2] The FEMA data can be found at https://www.fema.gov/media-library/assets/documents/28318, while the BEA data can be found at http://www.bea.gov/newsreleases/regional/lapi/lapi_newsrelease.htm.

[3] This is the last year for which data on personal income by county are available.

Q3 GDP Effect of Hurricane Harvey

		Low	High
(1)	**2015 Personal Income in Affected Areas** (% of total)	2.8	2.8
(2)	**Production Intensity During Direct Impact** (1 = full Intensity)	0.75	0.50
(3)	**Duration of Direct Impact** (days)	14	21
(4)	**Pre-Harvey Real GDP Forecast for Q3** (bil$, a.r.)	17,168	17,168
a)	In Directly Affected Areas	486	486
(5)	**Lost GDP After Adjusting for Duration and Intensity** (bil$, a.r.)	18	55
(6)	**Intra-Quarter Offset Share**	0.25	0.10
(7)	**Lost GDP After Adjusting for Intra-Quarter Offset** (bil$, a.r.)	14	50
(8)	**Hit to Annualized GDP Growth**	-0.3	-1.2

We use this percentage to determine the portion of 2017 Q3 GDP that is subject to direct disruption. Our latest tracking forecast for the level of real GDP in 2017 Q3 is about $17.2 trillion. The personal income share noted above implies that nearly $500 billion of that GDP would have originated in the 19 affected counties (line 4a of the table).

This would represent an estimate of the direct impact of Harvey on GDP assuming a *total loss* of GDP in the affected counties for the *entire duration* of the third quarter. Of course, production in the affected areas occurred normally prior to Harvey, and production could begin to recover in the affected areas before the conclusion of the third quarter. Furthermore, there will certainly be *some* production occurring in the affected counties during the period of direct impact.

To arrive at an estimated range of the direct impact, we posit alternative assumptions for (1) the duration of the direct impact (line 3 of the table) and (2) the degree to which activity is reduced during the direct impact in the affected counties (line 2 of the table). For our "low-impact" case, we assume the duration of the direct impact is 14 days, or 15% of the quarter. Furthermore, we assume that during the duration of direct impact, GDP is reduced by 25% in affected areas. Applying these percentages to the GDP figures above, our low-impact estimate is that GDP will be reduced in the third quarter by $18 billion in the affected counties (line 5 of the table).[4]

Were there no intra-quarter offsets, an $18 billion hit to GDP would reduce annualized GDP growth by four-tenths. But before and after natural disasters, there are offsets in the form of preparation and recovery activity that would not have occurred otherwise, and increases in production above baseline in both affected and unaffected areas (to the extent it is possible) to make up for lost output. In the low-impact case, we assume that 25% of the lost output is made up within the third quarter (line 6 of the table). This leaves the hit to third-quarter GDP at $14 billion (line 7). In terms of annualized GDP growth, this is worth three-tenths (line 8).

In the "high-impact" case, we assume a longer duration of direct impact (21 days, versus 14 days in the low-impact) and larger reduction of GDP below baseline during the direct impact (50% below baseline, versus 25% in the low-impact case). Furthermore, the longer duration of direct impact leaves less time in the third quarter for recovery of lost production, so we assume that only 10% of lost output is made up within the third quarter (versus 25% in the low-impact case). Taken together, these parameter values imply a hit of 1.2 percentage points on third-quarter GDP growth.

[4] Note that all of these figures are expressed at annual rates.

The effect on *fourth*-quarter GDP growth is likely to be positive. As long as recovery is underway by then, GDP will be rising faster than would have been the case in the absence of the third-quarter disruption.

This methodology captures the effect on GDP growth of disruptions to off-shore oil extraction only to the extent that the associated employee compensation is normally included in personal income in the effected counties. However, it misses the portion of lost value-added normally paid out as capital income, which need not accrue in the affected areas. Indeed, in recent years, employee compensation in oil and gas extraction has accounted for between only 10% - 20% of total value added in oil and gas extraction.[5] Industry sources indicate something like 330 thousand barrels per day of off-shore oil production has been halted. Assuming this shutdown lasts for two weeks, we estimate that third-quarter GDP would be reduced by roughly $1 billion, which is not enough to show up as one-tenth, after rounding, in terms of annualized GDP growth. So we think, to a first approximation, adding the impact of the shutdown in off-shore drilling would not lead to substantively different estimates of the GDP impact of Harvey.

Payroll Employment

The timing of Hurricane Harvey makes it unlikely that a substantive impact will show up in payroll employment. Someone is defined as employed in the payroll survey if they worked (or received pay) for any portion of their pay period that includes the 12th of the month. This means Harvey was too late in the month to affect August payroll employment, as all pay periods that include August 12th include several days unaffected by Harvey. For September, one would have to be away from work through at least September 15th to show up as not employed in the payroll survey. This is the ending date for the typical semi-monthly pay period. For those on weekly and about half of biweekly payrolls to show up as not employed in September, they would need to be away from work through September 16th, the final day of the typical weekly pay period and about one-half of biweekly pay periods that include the 12th of the month. Finally, those on monthly payrolls would need to be away from work for the entire month. We know that many people will be away from work for some time, but we think it's likely that most will be back to work prior to the middle of September, as could many be newly employed in recovery efforts by then, implying only a modest impact on September payroll employment. However, in our high-impact case, those on weekly payrolls, semi-monthly payrolls, and half of biweekly payrolls could be counted as not employed, implying a more substantive hit to September payrolls.

Inflation

A large share of US refining and distribution capacity is in the area directly affected by Hurricane Harvey. However, reports of ample inventories of gasoline heading into last week have the potential to limit the impact of supply disruptions on retail prices.[6] Furthermore, September and October RBOB gasoline futures prices have increased only about 15 cents and 10 cents, respectively, since August 22, suggesting that markets are not pricing in important or lasting disruptions. Unless and until conditions warrant, we are not inclined to expect much of a jump in gasoline prices and consumer prices more generally.

Summing Up

Our estimates of the impact of Harvey on Q3 GDP growth are rough and *depend critically* on assumptions for which we have only moderate confidence. The key assumptions are (1) the duration of the direct impact, (2) the extent to which activity is reduced during the period of direct impact in directly affected areas, and (3) the extent to which output is made up within the quarter. We don't hold strong convictions of the parameter assumptions employed in this RAQ. Clients of Macroeconomic Advisers can obtain a copy of our Hurricane Harvey worksheet into which they can insert their own parameter assumptions to arrive at alternative measures of the impact on third-quarter GDP growth.

[5] See BEA's GDP by Industry tables: https://www.bea.gov/iTable/index_industry_gdpindy.cfm.

[6] See, for example, this brief report from the International Energy Agency: https://www.iea.org/newsroom/news/2017/august/iea-closely-monitoring-situation-after-hurricane-harvey--.html.

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