

Economic impact of Hurricanes Harvey & Irma

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- **Gross losses could reach \$111bn for Texas and \$52bn for Florida**
- **However, the net economic impact will be modest after reconstruction is completed**
- **Overdevelopment and fast population growth in low-lying coastal areas increase disaster potential**
- **The biggest challenge for Houston is to maintain its long-term attractiveness**

Economic effects

Gross losses from natural disasters can be divided in lost value of capital stock and loss of short-term investment flows. Net losses take into account the gains from reconstruction activity. In terms of value-added, the destruction of capital stock -housing, commercial property, infrastructure and inventories- by itself does not reduce the level of current production or income. However, it does reduce wealth, the value of services of capital stock and tax revenues – mainly property taxes. This in turn causes a reduction in income, consumption, trade and investment, which reduces the level of economic activity, particularly over the short term.

Meanwhile, the immediate reduction in short-term investment flows reduces the level of economic activity through lower hours worked, income, sales, output, tax revenues and trade. Moreover, since the direct effects also have second round effects across different sectors, the total negative impact is augmented.

The negative impact tends to be large at first, but as conditions normalize, economic activity is positively affected as long as insurance and assistance funds are made available. In any case, the affected regions will face the challenge of maintaining its economic attractiveness over the longer-run, as devastating weather events may force people to move out and deter both future investment and migration, thereby reducing economic potential. For example, after Hurricane Katrina in 2005, New Orleans' nonfarm payroll declined almost 200 thousand and after 12 years, payroll is still 7% lower than before the storm.

Private insurance, FEMA, and other federal and state relief programs help rebuild, repair, renew and restore damaged capital stock. Therefore, the net economic cost will end up being significantly lower after reconstruction activity compensates lost value-added. Not surprisingly, most studies that focus on the net economic effects of natural disasters – excluding the lost value of capital stock – tend to arrive at relatively low figures, once both negative and positive effects

are accounted for. These results are consistent with our analysis on the effects of large storms on economic activity at the state and national level, which indicate that the negative effects of the storms subside and reverse within 12 to 18 months.

However, full replacement of capital assets may never happen and the recovery may take place over a longer period of time than initially expected. In fact, a large share of lost property, particularly for households and small businesses will not be covered by insurance policies. That is why federal and state aid becomes so relevant, particularly in cases of severe flooding. In the aftermath of natural disasters, the government plays a crucial role not only to maintain social stability but also to cover most of the uninsured losses and support a sustainable recovery. This explains why, on September 8, the White House and Congress assigned \$15.25bn in supplemental appropriations for disaster relief for the Department of Homeland Security, the Department of Housing and Urban Development, and the Small Business Administration. However, while positive for reconstruction, this type of response could also encourage moral hazard and adverse selection.

Harvey

After barreling into the state of Texas, as one of the largest and most damaging Hurricanes in U.S history, Hurricane Harvey devastated the Corpus Christi-Houston-Galveston area with catastrophic destruction, human losses, and unprecedented flooding. At landfall, winds were in excess of 130mph, which placed it as a major Category 4 Hurricane, tying for the 18th strongest hurricane on landfall in the U.S. since 1851 and ninth strongest in Texas. However, Harvey will likely be remembered for being the wettest tropical cyclone in the U.S. history, dropping 34 trillion gallons of water across East Texas and western Louisiana and almost 52 inches of rain in isolated areas. The flood was so large that GPS data indicates that the Earth's crust was pushed down by two centimeters.

As the region begins to pick up the pieces in the weeks, months and years to come, there is a growing concern about the impact that Hurricane Harvey will have on the regional and national economy. Storms of this magnitude can devastate local economies, resulting in significant economic and physical damages. This was the case of Hurricane Katrina (2005) and Superstorm Sandy (2012), which resulted in property losses of around \$160bn and \$70bn, respectively.

According to our estimates, **Harvey's economic cost could reach \$111bn**. Furthermore, our analysis suggests that **in 2017 and 2018, Texas real GDP growth will be around 2.7% instead of 4.3%, and 4.1% instead of 3.8%, respectively.**

Irma

After causing major destruction in the Caribbean, Hurricane Irma made landfall in the lower Florida Keys as a Category 4 storm with 130mph winds. The storm made a second landfall a few hours later near Marco Island, south of Naples on the Florida's west coast. Irma slowly made its way north bringing storm surges, heavy rain and flooding; some of the largest urban areas including Miami, Tampa and Jacksonville were affected. More than half of its residents were left without power, and despite intense efforts, as of September 17, 8% of customers still remained without electricity.

According to our estimates, **Irma's economic cost to Florida will reach \$52bn**. As a result, we have revised **Florida's real GDP growth forecast to 2.5% in 2017 and 3.4% in 2018, from our previous forecast of 3.6% and 3.3%, respectively**.

National Impact

In addition to the regional effects, there would also be an impact on the U.S economy. In the short-run, we can expect volatility in national and regional labor market indicators, spillovers to consumption from earning losses and higher gasoline prices, volatility in foreign trade due to damages to transportation infrastructure, and an upturn in commercial crude oil inventories (excluding strategic reserves).

Disruption to refining activity had a significant impact on gasoline prices. According to the EIA, U.S. refining capacity declined from almost 97% on August 25 to 78% on September 8. As a result, between August 21 and September 11, retail gasoline prices increased 32 cents (13.2%). However, as refineries normalize operations, we expect gasoline prices to moderate, thereby limiting the net effects on private consumption and GDP. For example, in the aftermath of Hurricane Katrina in 2005 and Hurricane Ike in 2008, the increase in gasoline prices was 17% and 5%, respectively. However, prices edged down and soon returned to pre-storm levels. Moreover, the decline in energy intensity in the last couple of decades has lowered the responsiveness of economic activity to changes in gasoline prices.

As with the regional effects, given that the recovery effort will be massive, there is a chance that net economic conditions will be largely unchanged relative to our baseline scenario.

As such, the net economic impact at the national level will be small, and thus we are maintaining our baseline forecast for GDP growth in 2017 at 2.1%. That said, we have lowered our 3Q17 estimate 2.4% from 2.6% previously; although, we anticipate that gains in 4Q17 should offset any weakness in the third quarter.

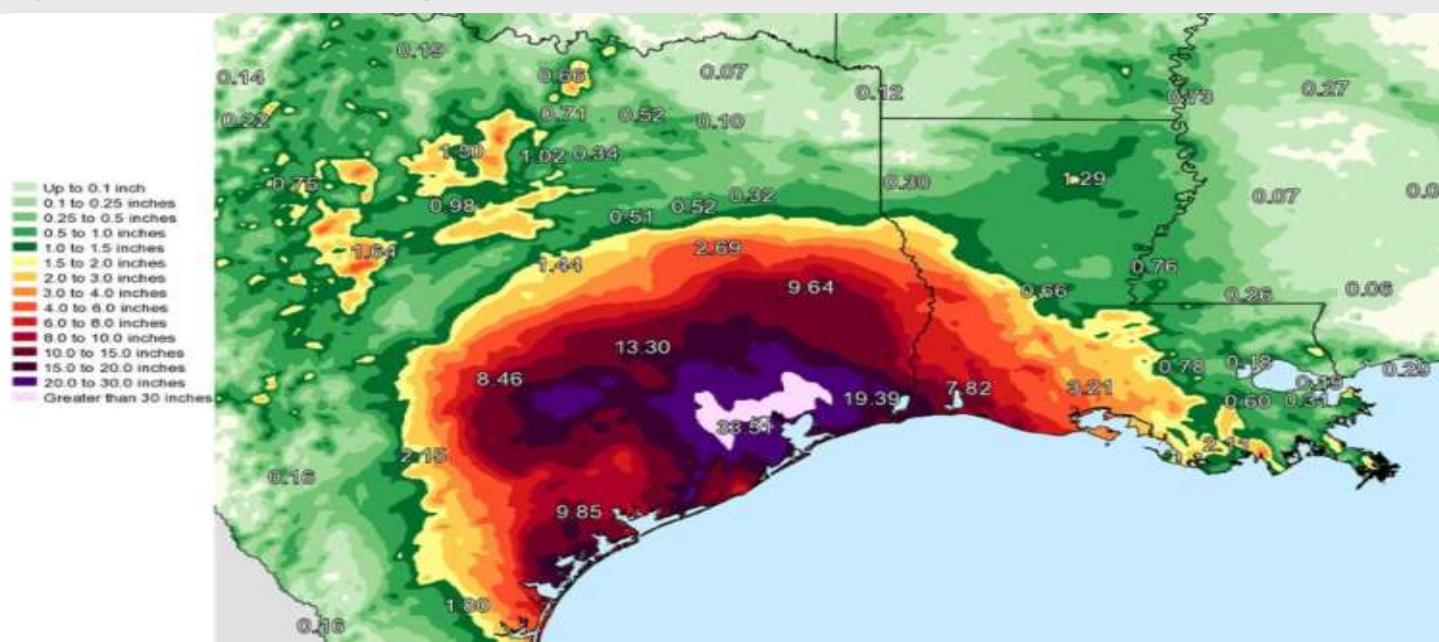
Similarly, we do not expect the rise in gasoline prices nor the short-term economic headwinds to prompt the Fed to abandon its current course of removing accommodation. As a result, our baseline scenario is unchanged. Nonetheless, if

conditions in the labor market deteriorate, the Fed could delay further rate increases. Likewise, if there is a persistent rise in inflation, the Fed could become slightly more hawkish. However, deviating from its current policy course is unlikely as far as the macroeconomic effects of the storms are seen as transitory. In fact, in 2005, the FOMC decided to keep monetary policy on the same course even after acknowledging the negative effects of Hurricane Katrina.

Based on our analysis of the effects of the storms on the banking industry, the likely outcomes include higher delinquency rates and deterioration in the quality of posted collaterals in the affected areas. Nonetheless, large and diversified banks should be able to overcome the obstacles more smoothly. Meanwhile, lending activity could accelerate as businesses and consumers engage in reconstruction efforts. In fact, banks have an important role to play in the recovery from the economic disaster and human suffering that Hurricanes Harvey and Irma have inflicted.

Finally, these storms highlight the need to openly discuss the risks and challenges of natural disasters, and create solutions that are both economically and politically acceptable. Population growth, overdevelopment and destruction of natural habitats, increase the probability and costs of catastrophic events. In addition, public policies that subsidize excessive risk taking and distort prices can have a significant impact on where people choose to live and how they perceive the government's role. Finally, the magnitude of Harvey, Irma and other recent storms highlights the effects of rising sea temperatures, the severe risks from climate change and the urgency to take action at every level of society to minimize the impact of an ever increasing number of super storms.

Figure 1. Observed Precipitation during Hurricane Harvey*



*Valid ending Monday August 28th, 2017 at 7AM CDT Source: National Weather Service

Table 1. Billion-Dollar Weather and Climate Disasters

Event	Begin date	End date	CPI-Adjusted estimated cost (\$bn)
Hurricane Katrina	8/25/2005	8/30/2005	\$160
Hurricane Harvey	8/25/2017	8/29/2017	\$111
Hurricane Sandy	10/30/2012	10/31/2012	\$70
Hurricane Irma	9/8/2017	9/11/2017	\$52
Hurricane Andrew	8/23/1992	8/27/1992	\$48
Midwest Flooding	6/27/1993	8/15/1993	\$36
Hurricane Ike	9/12/2008	9/14/2008	\$35
Hurricane Ivan	9/12/2004	9/21/2004	\$27
Hurricane Wilma	10/24/2005	10/24/2005	\$24
Hurricane Rita	9/20/2005	9/24/2005	\$24
Hurricane Charley	8/13/2004	8/14/2004	\$21
Hurricane Hugo	9/21/1989	9/22/1989	\$18
Hurricane Irene	8/26/2011	8/28/2011	\$15
Hurricane Frances	9/3/2004	9/9/2004	\$13
Tropical Storm Allison	6/5/2001	6/17/2001	\$12
Midwest Flooding	4/1/2008	6/30/2008	\$12
Southeast/Ohio Valley/Midwest Tornadoes	4/25/2011	4/28/2011	\$11
Louisiana Flooding	8/12/2016	8/15/2016	\$10

Source: NOAA National Centers for Environmental Information

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