



Hurricanes and labor market outcomes: Evidence for Mexico

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ABSTRACT

Hurricanes are becoming frequent events that affect more people every time, and in this context the identification of the effects on the labor market may be important for the policy design of mechanisms to cope more effectively with these shocks. Using hurricanes as exogenous shocks and with microdata from 32 metropolitan areas in Mexico from 2000 to 2011, we analyze the effect on the returns for skill levels, hours worked and jobs with access to social security. Results show that the impact seems to be mostly positive on wages and formal jobs for low educated workers. There is no specific pattern of results for intensity of the hurricanes.

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1. Introduction

Hurricanes are becoming common shocks in the Caribbean and the northern part of the Pacific. According to some researchers (Anthes et al., 2006) there is increasing evidence, although still uncertain, pointing to the fact that the warming of the oceans due to global climate change may result in seasons with higher frequency of hurricanes, even though some claim that the cyclonic activity in the previous decade has not been different from that of the first part of the 20th century (Landsea, 2005). Aside from this debate, the fact is that the hits by these climatic events are affecting more people and the identification of specifically affected sectors of the population becomes relevant for creating more precise public policy to cope with those shocks.

For Mexico, a country that is constantly hit by hurricanes on both the Atlantic–Caribbean and the Pacific coasts where approximately 24% of the total population dwells, the identification of who is affected is an issue that deserves to be analyzed for the social implications it may have on well-being. A middle-income country with high levels of poverty and inequality, and a labor market stuck in informality and low productivity activities, Mexico becomes an interesting field of study for social effects from hurricanes and other natural events.

Even though hurricanes, as with other disasters, introduce destruction of assets and infrastructure leading to an increase in aggregate poverty, it may also happen that, as explained by

Skidmore and Toya (2002) within an endogenous growth framework, the occurrence of a local disaster may increase the rates of economic growth. According to these authors, this may happen as the disaster negatively affects the rates of return on physical capital since a part of it is destroyed or damaged, thus relative higher human capital may increase their returns leading to higher growth rates. If this happens we should observe more demand for labor in the aftermath of a hurricane. Also, it could happen that there is an increase in investment due to the rebuilding process directly as a result of the use of money for disaster management and infrastructure with specific requirements for enduring shocks. Another mechanism comes from the adoption of new technologies given the replacement of capital.

There is only little evidence, however, of how shocks from natural disasters affect the labor market; in all cases, there is an increase in local wages after the shock, favoring to some extent the hypothesis of Skidmore and Toya (2002). Most of this research uses aggregated data at the village or county level, primarily using diverse natural disasters as shocks, with only a few studies focusing on the impact from hurricanes.

Mueller and Quisumbing (2009), for example, analyzed the effect of a severe flood on the labor market in Bangladesh. These authors find that although wages in the casual market did not decrease in the short term, they did however decline by about 5% over a period of 5 years after the shock. They also find that agricultural labor recovers faster than other sectors. However, recurrent floods in rural areas in Bangladesh have been shown to have positive long-term effects on agricultural earnings (Banerjee, 2007). Mueller and Osgood (2009) also analyzed the impact of droughts in the Brazilian labor market, finding a long-term

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negative impact on wages, especially for those in the middle class. In the Indonesian context, Kirchberger (2011) found that an earthquake resulted in an increase in wage premiums in affected localities while there was no evidence of an emigration response due to the shock.

External shocks leading to crop losses in Indonesia affecting household distribution of working hours were analyzed by Cameron and Worswick (2003), finding that households do not increase their hours worked but rather change their activity from agriculture to another sector, which enables them to avoid reducing their consumption. Jayachandran (2006) investigated how labor in villages changes due to crop variations induced by rainfall or droughts, finding intertemporal shifts of income and that local wages are less responsive to external shocks, also finding that those who are landless are less responsive to the shocks, as they are able to migrate easily to other places.

Belasen and Polachek (2009) studied the labor market of the Florida counties in reaction to hurricanes. Using aggregated data at the county level, they find that wages increase by up to 4.35% after a hurricane has directly impacted a county, but neighboring counties experience a decrease of about 4.5% in wages, assuming this happens because of migration between counties. The same authors (Belasen and Polachek, 2007) also find that after the first quarter of being hit by a strong hurricane, the affected locality experiences an increase of about 4.0% in wages, while if the hurricane is of low intensity then the increase is about 1.25%. In addition, there is a fall in employment while neighboring counties experience the opposite effect from those hit. McIntosh (2008) analyzed the impact of Hurricane Katrina on the labor market in Houston, a city receiving displaced people from New Orleans, finding that due to the immigration of Katrina evacuees, workers in Houston experienced a decrease of about 1.8% in wages.

Other previous studies related to hurricanes in Mexico have focused on measuring vulnerability in small villages (Krishnamurthy et al., 2011), finding infrastructure the most important factor for explaining local vulnerability, while others have focused on perceptions of coping mechanisms in small villages in the Caribbean side of the country, finding that using investment is perceived as more effective at fostering recovery and reconstruction (Manuel-Navarrete et al., 2011). All the previous studies have not focused on how those shocks have affected different skills, nor have they compared different shocks in several areas to differentiate the impact.

This paper contributes to the understanding of local impacts from hurricanes on labor outcomes for different skills in developing countries using the occurrence of hurricanes in Mexico as local exogenous shocks. To the extent that different impacts are obtained according to the level of skills and the local market, for example, reconstruction efforts may demand less skilled labor and policy implications could be that programs for coping with shocks in affected localities could be better tailored to local characteristics and groups of workers.

Using microdata with a rotating panel from the National Employment Surveys for 32 metropolitan areas in Mexico from 2000 to 2011, this research attempts to measure how shocks derived from the impact of hurricanes affect wages, hours worked, and the probability of obtaining a formal job for different levels of skills. In order to do so, we use a difference-in-difference approach, exploiting the hit of the hurricanes as exogenous shocks. Due to the fact that several areas are affected as hurricanes hit at different times, we use as many different experimental treatment group locations as hurricanes hit. Further, taking advantage that several areas from the 32 metropolitan areas are not affected by hurricanes, we use three different control groups in order to proxy for a reliable group to compare. In addition, we address potential identification through the use of quarterly and yearly time effects, and especially through

variables measuring the evolution of labor market outcomes for each area prior to the shock, and the interactions of such variables with the treatment variables.

The paper is structured as follows. In Section 2 we introduce the data to be used and its description, also including how treatment and control areas are classified. Section 3 presents the model to be used and the variables included. Results for the different labor outcomes are presented in Section 4. Finally, conclusions and implications are introduced in Section 5. In addition, material is provided in the [supplemental online appendix](#) including the evolution of trends for treatment and control areas in labor outcomes, the basic statistics of variables and the results for some migration proxies.

2. Description of data

We gathered quarterly data from the Encuesta Nacional de Empleo Trimestral (ENET) [Quarterly Survey of National Employment] and Encuesta Nacional de Ocupaciones y Empleo (ENOE) [National Survey of Employment and Occupations] from 2000 to 2011. These surveys ask questions regarding the labor status and characteristics of jobs as well as socio-demographic details about the members of the household. This is a rotating panel survey, following individuals for five consecutive quarters, and with 20% of the panel replaced each quarter.

Data in our sample is for employed males with positive earnings, aged 18–65 years, in activities other than the primary sector (females have higher elasticity to some changes in the labor market, creating the additional problem of selection). We use data for the 32 metropolitan areas that have been surveyed in a consistent manner over time. We built the database with individuals who have completed the five consecutive questionnaires. We started with individuals in the first quarter of 2000 and finished at the third quarter of 2011.

We are calling treatment areas those which have suffered the impact of a hurricane, while those areas without any impact are called control areas. We take advantage of the fact that hurricanes hit different areas at different times, therefore, as in Belasen and Polachek (2009), we have as many random experimental groups as there are hurricanes in the period. Since the control groups are those metropolitan areas not affected by hurricanes, this may cause some concern for the quality of such control groups. In order to check the robustness of the estimations, we consider three different control groups where we reduce the number of control areas according to location on the coast. In this way, our first control group is for all metropolitan areas not hit by hurricanes, the second control group reduces the sample to metropolitan areas in coastal states, and the third control group reduces the sample to only the metropolitan areas on the coast. These three control groups will be compared with the areas that have a hurricane in order to determine the impact of such shocks. In this way it is also possible to reduce possible hidden variables with the labor outcomes and make the findings more robust.

Thirteen events occurred in the metropolitan areas that we have data for (2000–2011) affecting eight localities as described in Table 1. Of these 13 events, 11 were hurricanes and two were tropical storms on the verge of being a hurricane and generating similar patterns of damage. The table also displays the areas in the different control groups to be used as comparisons in separate calculations. In [Appendix A](#) a map of Mexico displays the localization of the areas.

Even though several hurricanes have affected Mexico, we are only focusing on metropolitan areas covered in the National Employment Surveys. Table 2 presents the name of the hurricane and the intensity as reported by the National Hurricane Center, located in Miami, an organization that tracks all hurricanes and

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