Natural disasters and household labor force participation in Mexico

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Mexico location and geography make it prone to a variety of natural disasters, from earthquakes, hurricanes and tropical storms to severe droughts (De la Fuente 2010:2) These events are expected to increase in some regions as a result of geological adjustments or climate changes, impacting population well-being. To this geophysical vulnerability it is necessary to add social one, given country's limited infrastructure, high poverty levels and human settlement patterns. Natural disaster could impact household welfare across multiple dimensions, such as health, assets and livelihoods. The impact of a disaster depends on its magnitude, preexisting conditions and the adaptive capacity of the households. Different types of natural events have distinct impacts on the population since exposition and vulnerability vary across place, time and population subgroups.

Studies show that the household's labor participation varies after an external and unexpected event as it occurs in an economic crisis. With a natural disaster event, household labor participation may change depending on the nature of the emergency situation, and household socioeconomic and demographic characteristics. However, the literature does not agree on the expected effects. Some studies suggest that there is no direct relationship between a natural disaster and household welfare, and we should not expect a change in household labor force participation after a natural disaster. By the contrary, other studies point that natural disaster impact both labor force participation and wages since they impact local communities and households assets. Some studies highlight that large events destroy employment sources and decrease labor force participation (Balensen & Polachek 2008). Others find the opposite effect, with increments on labor force participation given reconstruction needs and impacts on household wealth (Baez & Santos 2007). Studies also suggest that natural disasters impact on wages is mediated by education: after a disaster there is a large need for physical capital rather than human capital and, therefore, demand for low-skill workers increases (Rodríguez-Oreggia & Rivera Olvera 2011: 126, Mauro & Spilimbergo 1999). Migration could increase labor force shortage, increasing even further the demand for labor and, therefore, increasing wages. Furthermore, other studies found that a temporal event, in the long run, does not have lasting effects on economic variables, even if altered in the short run (Lucas y Rapping 1969:349). These authors suggest that two years after the occurrence of a hydrometeorological disaster no changes are perceived, once that economic variables return to previous levels.

The debate in the literature makes evident the need to reexamine the impact of natural disasters on labor force participation, net of other changes in household wealth and demographic composition. In particular, this paper looks to address two issues. First, to

distinguish impacts in the local labor markets from impacts on households assets. Second, we want to consider short and medium-term impacts.

Data and Methods

The Mexican Family Life Survey (MxFLS) is a multilevel longitudinal survey that collects information on household socioeconomic conditions as well as the communities they inhabit. There are two publicly available waves (2002) and (2005), but the information collected is retrospective and covers a longer period. The panel sample includes 7573 households and 150 communities. Unfortunately, the survey does not provide the exact timing of disaster occurrence nor employment change since variables are code in one year period. Moreover, the time span covered by employment questions and natural disaster ones, only overlap in a few years (2000, 2002, 2003, and 2004). Given these characteristics, we cannot use other methods such as event history analysis. Despite these limitations, the MxFLS is a rare dataset that allows exploring natural disaster impacts on household well-being and their adaptation strategies. To make the most of it, we will run a multilevel multinomial model that estimate the impact of disasters and other relevant determinants on the change in the labor force participation. To measure short-term impacts we will model changes in one-year period, and to consider medium impacts we will look at changes in a four year window (2002-2005)

The MxFLS includes two questions about natural disasters. First, at the community level, the survey asks whether some natural disaster occurred in the last year and its type (earthquakes, droughts, hurricanes, etc.), but it does not qualify its magnitude. We use this variable along with other characteristics of the community (infrastructure, economic profile, etc.) to analyze natural disasters impacts on local labor markets and then if its impact on household labor force participation. A second survey question, at the household level, asks whether the household experience catastrophic losses (loss of housing, business or crops). This allows examining changes in the labor force participation due to assets losses. In both cases, we control for other socioeconomic characteristics and changes, namely: education, age, sex, marital status and occupation of the household head, and household size, family structure, dependency ratio, remittances, dwelling conditions, place of residence, and income levels.

Preliminary results

MxFLS data show that the number of communities impacted by a natural disaster grew in the survey period, moving from a 25.7 % in 2002 to 53% in 2005. In the last wave, around 41% of the households live in a community stroked by a natural extreme. However, only 2% de of the households experience catastrophic losses (housing, business or crop). Moreover, data suggest that 23% of the households were impacted by more than one event in a four year window.

Table 1 describes some characteristics of households suffered catastrophic damage and compares them with those who did not. The first feature is that households with large losses

tend to live in rural rather than urban. Additionally, these homes have a demographic profile that confirms their vulnerability. Higher proportions have a less educated household head, have larger household sizes, with a higher number of older adults and their housing and sanitary conditions are worse (see table1).

As shown in Table 2, most households change their labor force participation rate between 2002 and 2005: 41% increased 25% decreased and 34% remain unchanged. However, if we compare households in impacted communities versus those undamaged, there are not significant differences among them. However, those households affected by catastrophic losses show significant differences in the labor force participation changes compared to those who did not.

A multinomial explanatory model (single-level) of medium-term impact show that changes in socioeconomic characteristics of the household impact changes in the labor force participation rate of the household, both in terms of increments and decrements of it (Table 3 for detail results). The model also shows that a disaster that impacts the community is not significantly associated with a change in the labor force participation, in any direction. However, a disaster that impacts household assets is associated with a higher risk of a decrement in the labor force participation, after controlling for other socio-demographic factors. Moreover, this variable does not impact the risk of diminishing labor force participation. These results provide preliminary support for the argument that is the direct impact on household assets that matter; however, rather than increasing the need for incorporating labor force into the market, damages tend to withdraw labor participants. This could be associated with domestic demands due to reconstruction or losses of means to make a living, particularly relevant for self-employment and family business. In the paper, we will consider more carefully these explanations and develop a full multilevel model..

Table 1. **Household characteristics affected by catastrophic events**

Characteristics	2002		2005	
	Unaffected	*Affected*	*Unaffected*	*Affected*
Rural	26%	53%	24%	48%
Age of household head	47,03	53,99	49,99	56,73
Education of household head				
No education	14%	28%	25%	36%
Basic education	66%	70%	65%	60%
Higher education	20%	3%	20%	4%
Average household size	4.30	4.85	4.66	5.57
Sanitary housing condition (index)	0.77	0.63	0.78	0.60
Housing quality (index)	0.84	0.77	0.86	0.78

Source: MxFLS 2002 and 2005

Table 2. Change in household labor participation rate 2002-2005

Natural Disasters impact communities			
Labor participation rate	*Unaffected*	*Affected*	Total
Increase	42	41	41
Equal	35	33	34
Decrease	24	26	25
Catastrophic losses (%)			
Labor participation rate	*Unaffected*	*Affected*	Total
Increase	41	53	41
Equal	34	22	34
Decrease	25	25	25

Source: MxFLS 2002 and 2005

Table 3: Results of the multinomial model (relative risk)

Variable	*Increase in labor force*	*Decrease in labor force*
Household head		
age	1.18**	1.20**
age ^{2}	0.99**	0.99**
man (reference)		
woman	0.71**	0.95
Basic education (reference)		
no education	0.96	0.90
higher education	0.89	0.96
Change in marital status	1.29**	0.97
Occupation Technicians (reference)		
professional	0.69**	0.85
services	0.76**	1.26**
education	0.80	0.71
farming	0.81*	1.25**
household characteristics		
Change in Household size	1.18**	1.30**
Change in sex ratio	1.11**	1.14**
Change in household structure	2.02**	2.12**
Presence of minors (>12)	1.41**	1.14
housing condition index	1.04	1.21
Housing sanitary conditions index	0.80*	1.00
Rural	0.94	0.98
Presence of retirees	0.92	0.78*
Remittances	1.20**	1.09
expenditure quintile 1 (reference)		
quintile 2	1.20*	1.15
quintile 3	1.12	1.55**
quintile 4	1.08	1.36**
quintile 5	0.79**	1.20*
natural disaster (community)	0.97	0.98
catastrophic losses	1.56*	1.14
Constant	0.01**	0.01**

*p<0.10 ; **p<0.05

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