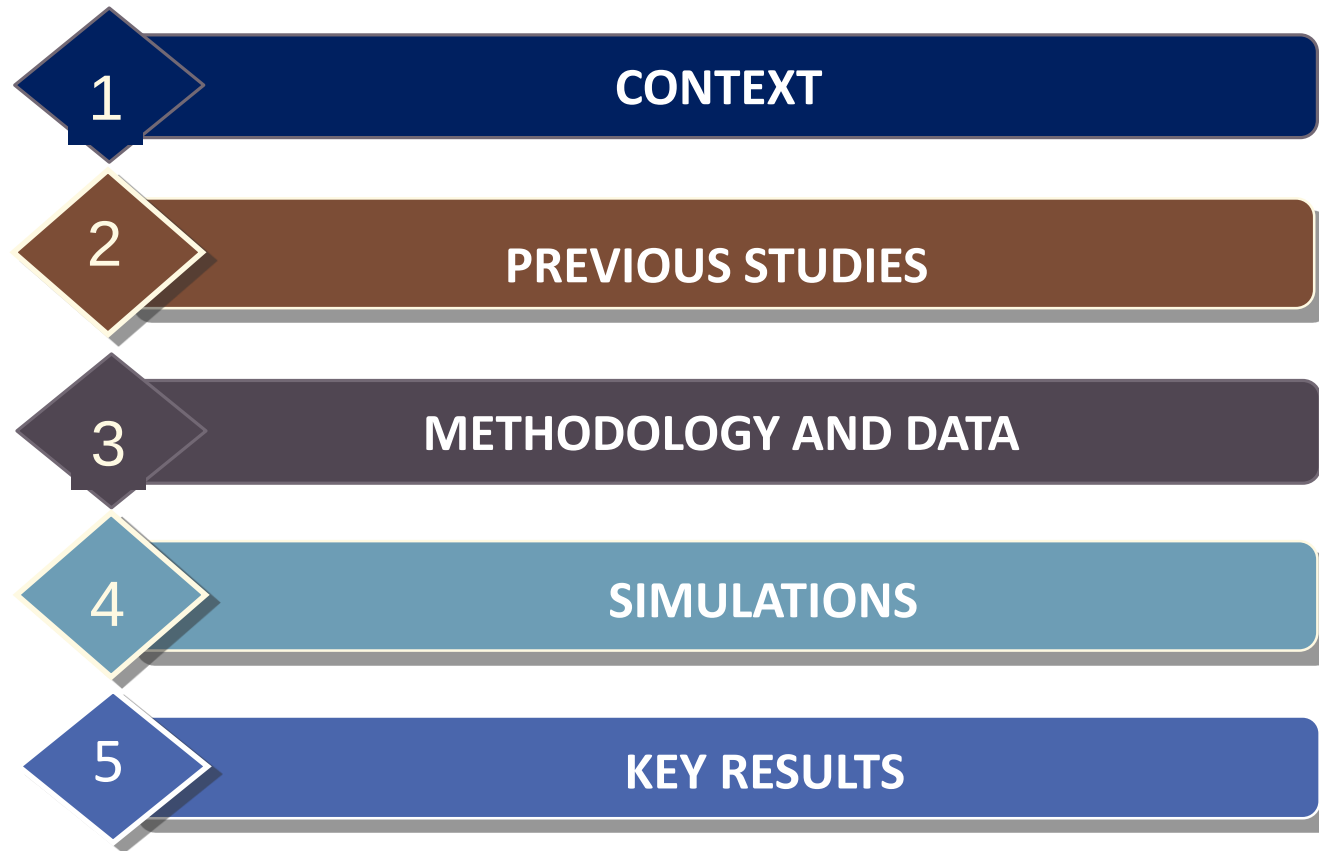


Climate change, labour markets and poverty in Bolivia: Why does gender matter?

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CONTEXT

- ❖ Paraguay and Bolivia are the most vulnerable countries in South America (Vulnerability Index, 2015).
- ❖ Kreft et al (2016), indicate that Bolivia ranks 8th among the countries most affected by extreme weather events in 2014 and 33rd in 2013.
- ❖ According to Andersen et al (2014), the total impact of climate change on the agricultural sector would represent a total loss of 106 billion (2010-2100), or 2.1% of total GDP.
- ❖ Similarly, according to the ILO (2018), 26% of total employment in Bolivia is generated by the agricultural sector, while the Latin American average is (15%). A large part of this population is rural, including women.
- ❖ Bolivia is also characterized by problems such as poverty and inequality. Poverty declined from 59.6% in 2005 to 34.6% in 2018 (WDI, 2019).

CONTEXT: Gender inequalities between urban and rural areas in Bolivia

Distribution of poverty (in %)

Household category	Income poverty (P0) (%)
Urban male	26.4
Rural male	50.5
MALE	31.9
Urban female	28.2
Rural female	52.0
FEMALE	33.3

Distribution of labour force (in %)

Employment status	Male		Female		Female intensity (%)
	Urban (%)	Rural (%)	Urban (%)	Rural (%)	
Employed	14.4	9.4	1.2	0.5	6.2
Wage worker	30.6	5.2	31.8	6.1	47.2
Own-account worker	38.7	60.1	43.4	29.6	44.5
Employer	7.6	4.3	2.9	1.0	49.8
Unpaid family worker or apprentice	8.5	20.8	15.9	61.9	66.1
Household Worker/Employee	0.2	0.2	4.7	0.9	95.0
TOTAL	100.0	100.0	100.0	100.0	

- ❖ According to the WDI (2018), the activity rate of women is lower than that of men (57% vs 79%).
- ❖ Bolivian women are much more likely than men to work in so-called vulnerable jobs (63% versus 53.7%).
- ❖ Rural women spend up to four times as much time as men on household tasks. (Canelas & Salazar, 2014)

CONTEXT: Vulnerable population in a context of climate change

- ❖ The high participation of women in the non-commercial sphere and particularly in domestic tasks could explain their low participation in the formal labour market.
- ❖ This situation could worsen even more in a context of climate change, where sectors such as agriculture or livestock, could suffer the most severe consequences, but distortions in the labour market could also be generated, compromising the well-being of the most vulnerable workers.
- ❖ The most vulnerable populations could be the most affected by climate change given their dependence on the agricultural sector, and high probability of falling into poverty.
- ❖ Moreover, impacts of climate changes could have side effects on women with the destruction of infrastructure leading to a longer walk to fetch water or wood, increasing the time women spend on the non-economic sphere, and therefore reducing their available time to work on a paid activity.
- ❖ This study aims to analyse the effects of climate change on poverty in Bolivia with a gender lens.

PREVIOUS STUDIES

- ❖ Many studies evaluate the impacts of climate change on economic activities, pointing out the vulnerability of the agricultural sector (Field et al, 2014; Fischer et al., 2005; Galindo et al., 2014; Hertel and Rosch, 2010; Thurlow et al., 2009).

Specific studies on CC with CGE models

Studies in the LAC region:

- ❖ Specific studies for the different countries in the LAC region report a variety of effects (Ponce et al., 2014; Vargas et al 2017)

Studies in Bolivia:

- ❖ Andersen et al. (2014), indicate that the effects of climate change affected agricultural productivity, generating significant losses.
- ❖ Aliaga and Aguilar (2009) ; Jemio et al. (2014) and Viscarra (2014) find similar negative impacts on the economy and specifically on the agricultural sector.

PREVIOUS STUDIES

Studies that include vulnerable population:

- ❖ Chitiga et al. 2019: CC in South Africa
- ❖ Field et al (2014) in LAC countries indicates that CC disproportionately affects the poor.

All the previously cited studies explored different climate change scenarios, however they only focused on the formal sector of the economy, without taking into account the existence of unpaid activities. Particularly the existence of unpaid domestic work, which in the case of Bolivia is a relevant aspect.

Studies that motivated and justified the research

- ❖ Easting (2018) suggest that climate shocks and climatic disasters exert a broadly negative impact on gender equality, as deviations from long-term mean temperatures are associated with declines in women's economic and social rights.
- ❖ There is a consensus that the most vulnerable populations will be hardest hit by CC (Field et al., 2014; IPCC, 2014)
- ❖ **This paper contributes to the application of CGE models by introducing domestic production to assess the impact of CC on the labour market and women's poverty in Bolivia**

METHODOLOGY AND DATA

Base model

- ❖ We use the PEP 1-1 model of Decaluwé et al (2013). However, several assumptions have been adjusted

Labour market

- ❖ The labour factor is broken down by level of qualification (Skilled and unskilled)
- ❖ Then, a gender dimension is introduced in each level of qualification. (CES functions)
- ❖ Based on Fontana and Wood (2000) and Fofana et al (2003) we propose an endogenous labour supply.

Micro-module

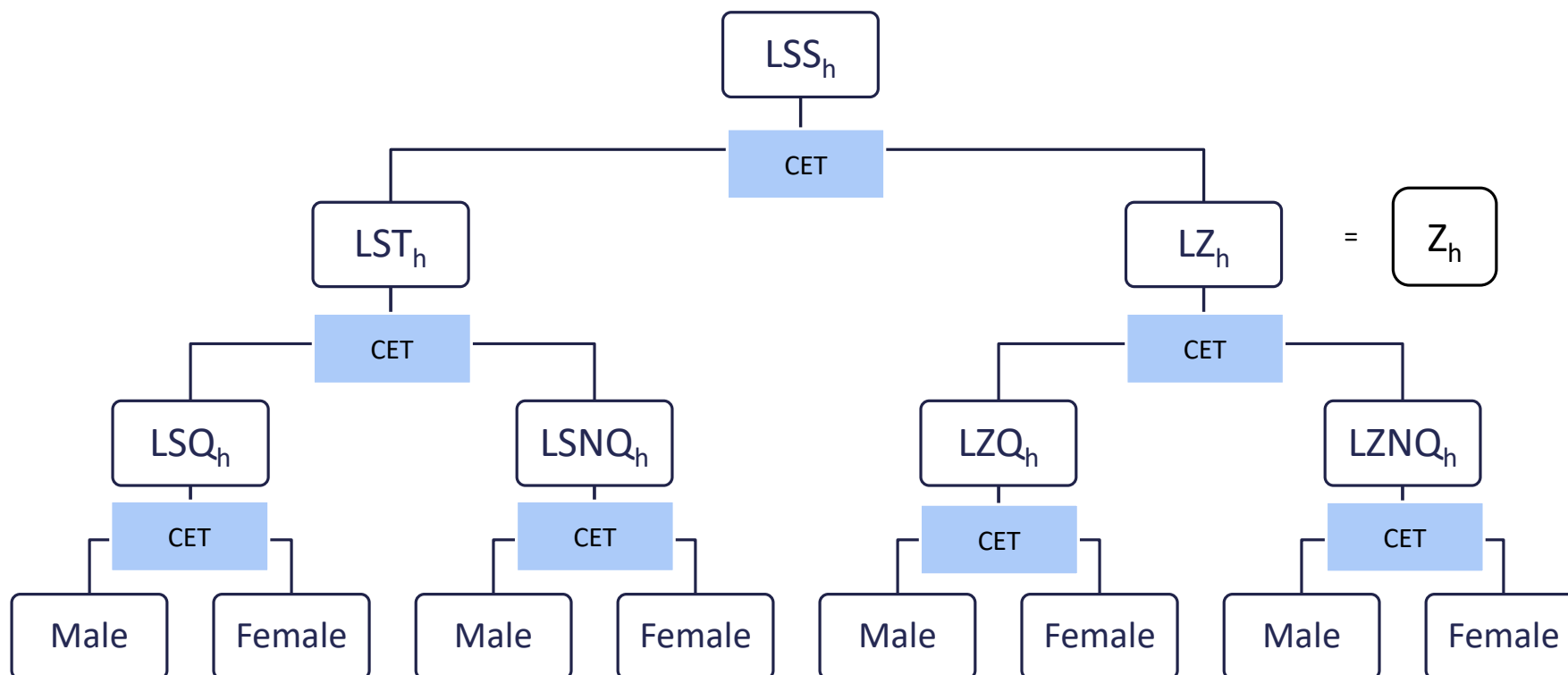
- ❖ The CGE model is linked to a microsimulation module to assess the effects on poverty (FGT indicators)

Data

- ❖ Social Accounting Matrix from Bolivia for year 2012 (IFPRI, 2018), National Household Survey (2018)
- ❖ Morales et al. (2017) and Sevillano Cordero (2012) for elasticity estimations.
- ❖ To define the domestic labour supply, we used Lundvall et al (2015) and estimates of 2 studies based on time use survey in Bolivia: Medeiros et al (2010) et Canelas and Salazar (2014).

METHODOLOGY AND DATA

Structure of the endogenous labour supply and domestic production



LSS_h =Total available labour supply

LST_h =Total available labour supply in formal labour market,

LZ_h =Total available labour supply in domestic labour market,

LSQ_h =Skilled labour supply formal market,

$LSNQ_h$ =Unskilled labour supply formal market,

LZQ_h = Skilled labour supply domestic market,

$LZNQ_h$ =Unskilled labour supply domestic market,

Z_h =Domestic production.

SIMULATIONS

Simulation 1 « DAM_PX » : Climate damage in land and agricultural capital



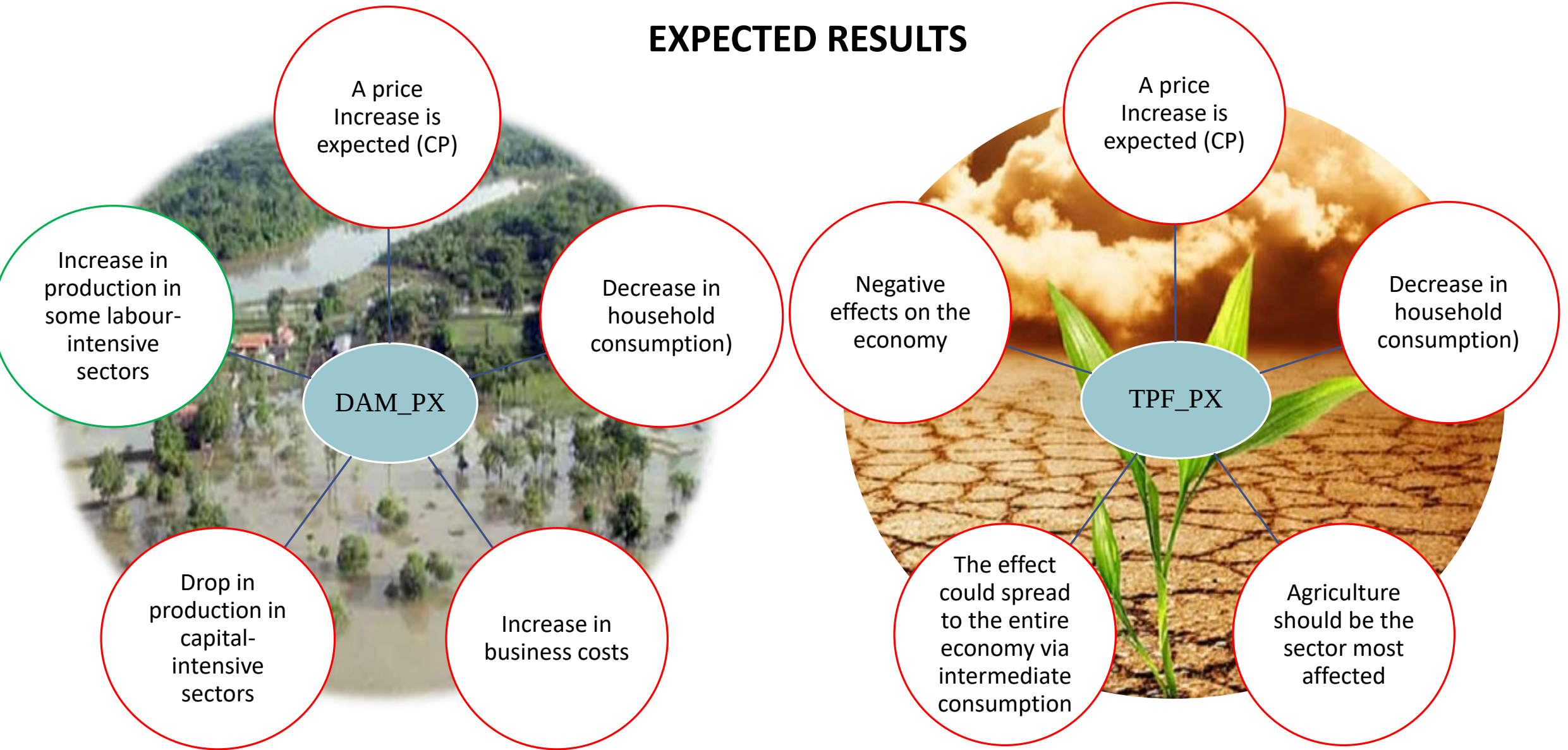
- ❖ Damage and losses due to climate events in the agriculture and livestock sector in Bolivia. (UDAPE, 2015). This shock is introduced exogenously affecting the capital and land production factor for agricultural and livestock sectors.
- ❖ Increase in world prices: Traditional agriculture, Industrial agriculture and livestock (Nelson et al., 2009)

Simulation 2 « TPF_PX » : Decrease in production yields in agriculture



- ❖ Decrease in production yields in two types of agriculture: Modern (which decreases by 5 %) and Traditional (which decreases 12%). (Viscarra et al. 2018)
- ❖ Increase in world prices: Traditional agriculture, Industrial agriculture and livestock (Nelson et al., 2009)

EXPECTED RESULTS



RESULTS

Macroeconomic Results (percentage change from base)

Item	Sim 1 "DAM_PX"	Sim 2 "TPF_PX"
Real consumption budget of households	-0,51	-1,38
Total investment expenditures	1,76	1,10
Government consumption	-1,21	-1,20
Real GDP at basic prices	-0,13	-0,82
Consumer price index ^a	2,08	3,07

Source: Calculations based on the CGE model

RESULTS

Sectoral effects

DAM
PX

- ❖ Interestingly, to compensate for damages and losses in capital and land, employment increases in agricultural sectors.
- ❖ The first simulation that plays on capital benefiting mainly the labour-intensive agricultural sectors that increase their production and an increase in exports but only for cereal and Coca crops.
- ❖ The results turn out to be favourable for 10 out of 20 sectors. (6 agricultural crops, Livestock, food, commercial, and water gas & electricity).

TPF
PX

- ❖ The second simulation affecting agricultural productivity shows even more negative impacts for the economy as a whole. As expected, the agricultural sector is the most affected, with production losses ranging from 1% to 8%
- ❖ Only 3 of the 20 sectors show increases in production (Sugarcane, Livestock, food)
- ❖ Non-agricultural sectors most affected: Hotels and restaurants, Textile industry and Machinery from 1% to 2,3%.

RESULTS

Effects on the female formal and domestic market by gender and skills (in %)

Location	Gender	Sim 1 "DAM_PX"				Sim 2 "TPF_PX"			
		Skilled		Unskilled		Skilled		Unskilled	
		Domest	Formal	Domest	Formal	Domest	Formal	Domest	Formal
Rural	Male	0,35	-0,17	-0,23	0,03	0,73	-0,34	-0,62	0,08
	Female	0,40	-0,21	-0,13	0,02	0,77	-0,41	-0,41	0,05
Urban	Male	0,61	-0,11	-0,49	0,09	1,27	-0,23	-1,10	0,20
	Female	0,71	-0,14	-0,50	0,09	1,40	-0,27	-1,08	0,19
TOTAL		0,59	-0,12	-0,44	0,07	1,20	-0,25	-1,00	0,16

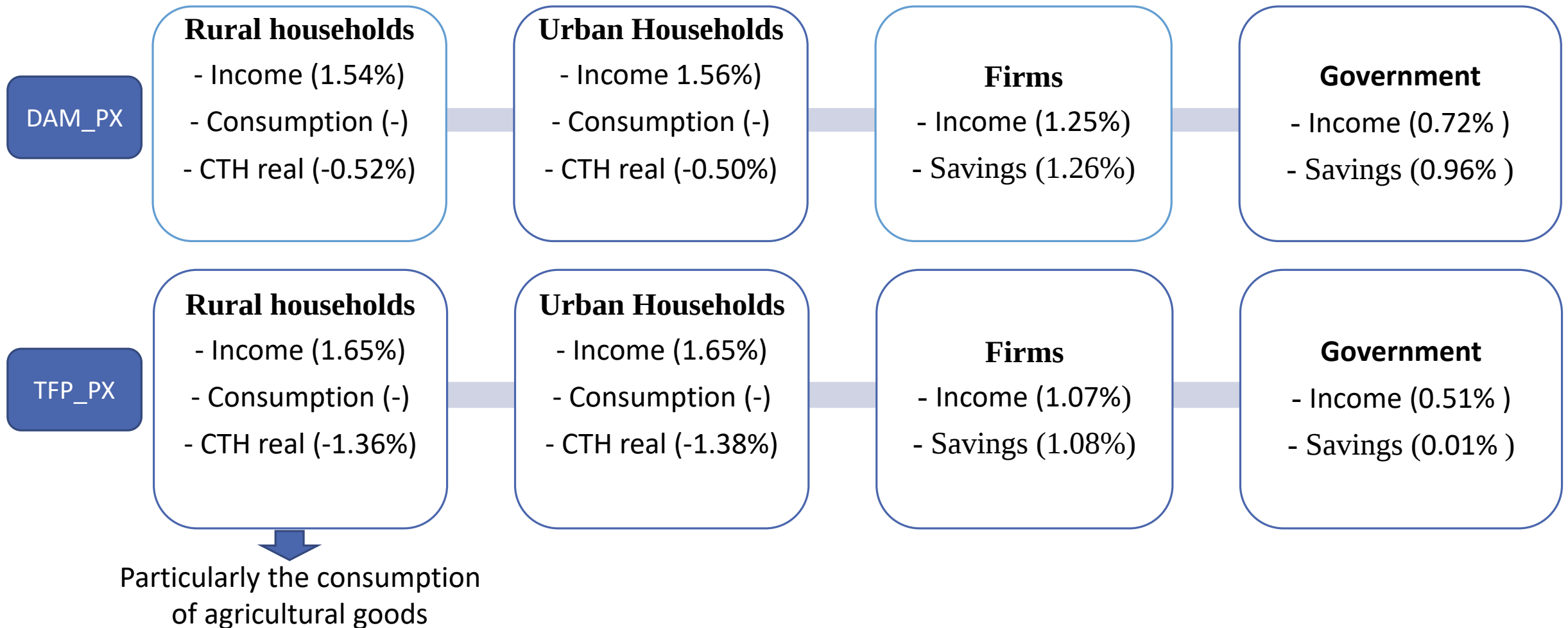
Source: Calculations based on the CGE model

Formal=Formal labour market,

Domest=Domestic labour market,

RESULTS

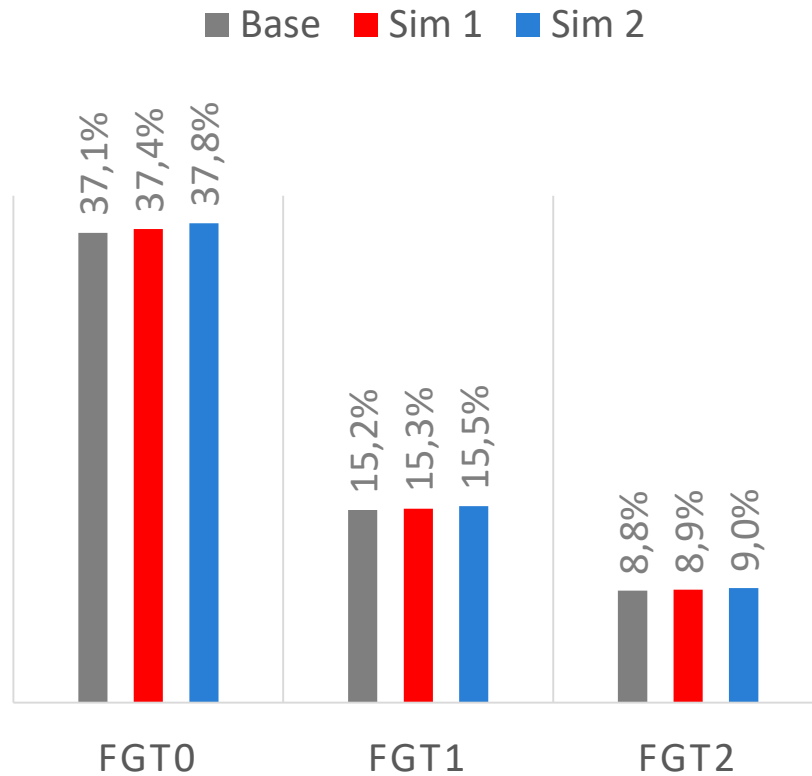
Effects on economic agents



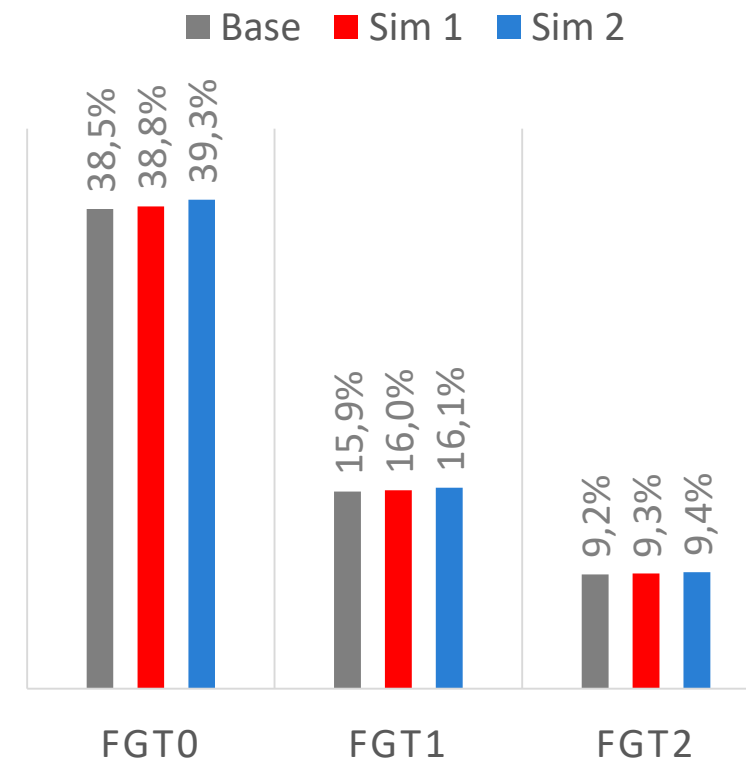
RESULTS

Poverty effects (in %)

EFFETS ON MALE POVERTY



EFFETS ON FEMALE POVERTY



CONCLUSIONS

- ❖ This study provides some insights into the effects that climate change may have on the labour market and poverty levels in Bolivia. We found that the most negative effects would be concentrated on households.
- ❖ Both simulation shows negative impacts for the economy as a whole. As expected, the agricultural sector is the most affected, particularly in the second simulation where the production losses ranging from 1% to 8%
- ❖ We also note that the effects of climate change mainly affect women more than men, limiting their participation in the formal market and increasing their levels of poverty, particularly among women in the rural sector, making them a highly vulnerable population in a context of climate change
- ❖ Both simulations increase the number of poor households, and women are more affected than men. However, the increases are more significant in the second simulation, making about 40% of female-headed households poor.