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The role of tax–benefit systems in protecting household incomes in Latin America during the COVID-19 pandemic

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Abstract: The COVID-19 pandemic drastically affected household incomes around the world. In developed economies, pre-pandemic tax–benefit policies and emergency transfers mitigated to a large extent the negative income shock. However, less is known about the effect of government intervention on household incomes in developing countries. The aim of this paper is to assess in a comparative way the role of tax–benefit policies in protecting household incomes during the pandemic in seven Latin American countries: Argentina, Bolivia, Colombia, Ecuador, Mexico, Peru, and Uruguay. Departing from previous studies, we assess the effects both of expanded social assistance programmes and of automatic stabilizers (i.e. pre-pandemic taxes and benefits). We find an important cushioning effect of emergency policies at the bottom of the pre-pandemic income distribution, whereas automatic stabilizers are mostly present at the top of the distribution as a result of reduced social insurance and tax payments during the pandemic.

Key words: taxes, benefits, COVID-19, Latin America, automatic stabilizers

JEL classification: I32, I38, H24, D13

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1 Introduction

The COVID-19 pandemic has caused a historical economic crisis as it has increased unemployment and poverty around the world. In 2020, the pandemic destroyed 400 million jobs globally (ILO 2020) and is estimated to have pushed an additional 97 million people into poverty (World Bank 2020). According to ECLAC (2021), in Latin America, the pandemic caused a 7.7 per cent drop in the 2020 gross domestic product (GDP). Likewise, the unemployment rate in the region reached 13 per cent, an increase of 4.9 percentage points compared to 2019 (ILO 2020). Similarly, the total number of poor people in the region is estimated to have reached 209 million, 22 million more than the previous year. Of that total, 78 million people were in extreme poverty, 8 million more than in 2019.

The literature on the economic effects of the COVID-19 pandemic has grown rapidly. This is especially true for developed economies. Most studies on the distributional effects of COVID-19 find that tax–benefit systems were effective at stabilizing household incomes, especially considering the emergency policies implemented. For instance, in Europe, discretionary tax–benefit policies reduced household disposable income losses from -9.3 to -4.3 per cent (Almeida et al. 2021), and for the UK the figure went from -16.2 to -6.9 per cent in the second quarter of 2020 (Brewer and Tasseva 2021). However, there are fewer comparative studies on the role of tax–benefit policies in Latin America. For instance, Lustig et al. (2020) analyse the distributional effect of emergency policies in Argentina, Brazil, Colombia, and Mexico, and Avellaneda et al. (2021) focus on three Andean region countries (Ecuador, Colombia, and Peru). In addition to the role of emergency policies, Avellaneda et al. (2021) analyse the role of automatic stabilizers in the pre-pandemic tax–benefit system.

Prior to the pandemic, Latin America was ranked as one of the most unequal regions in the world (Robles and Rossel 2021) and was characterized by a limited redistributive role of tax–benefit systems (Arancibia et al. 2019; Lustig 2017). Evidence on the impact of the COVID-19 pandemic on poverty and inequality also points to Latin America as one of the most affected regions in the world (Lakner et al. 2021). In this sense, social inequalities may have exacerbated the situation. Therefore, further evidence is needed on the extent to which tax–benefit systems contribute to protecting household incomes in the event of economic crises.

It is against this backdrop that our research aims to provide comparative evidence on the role of tax–benefit systems in mitigating the impact of the COVID pandemic in Latin America. Departing from previous research for the region (Lustig et al. 2020), our analysis seeks to draw conclusions both about the effectiveness of emergency policies and about the stabilizing role of pre-pandemic tax–benefit systems. We evaluate which types of policies have been more effective in protecting households in the region and provide insights into potential pathways to reform the design of policies to build stronger welfare systems for the future.

We focus on seven Latin American countries with varying levels of pre-pandemic income inequality and tax–benefit redistribution. They are Argentina, Bolivia, Colombia, Ecuador, Mexico, Peru, and Uruguay. We make use of harmonized tax–benefit microsimulation models applied to nationally representative household survey data for each Latin American country. Based on data collected before and at the time of the pandemic, the microsimulation models allow us to decompose changes in the distribution of household disposable income into the contribution of: (i) earnings losses, (ii) pre-crisis tax–benefit policies (i.e. automatic stabilizers), and (iii) COVID-related emergency measures implemented by the government. The decomposition contrasts the

situation at the end of 2019 (2019Q4) with that at the second quarter of 2020 (2020Q2), when the economies were hit the hardest, and at the end of 2020 (2020Q4).

Our results show a great deal of heterogeneity between countries in terms of earnings losses and the effect of tax–benefit policies. The largest drop in earnings is observed in Ecuador and Peru, where, on average, earnings losses contribute to a 40 per cent reduction in household disposable income in the second quarter of 2020. By the end of 2020, the economy recovers but earnings remain below the pre-pandemic levels, especially in Peru where earnings losses account for a 20 per cent drop in disposable income. In all countries, COVID emergency policies cushion household incomes at the bottom of the distribution, although to different extents due to the varying generosity of expanded social assistance programmes. In the second quarter of 2020, the largest cushioning effect of COVID-related policies is observed in Bolivia and Peru. In addition to the generosity of expanded social assistance programmes, the duration of benefit payments plays an important role. At the end of 2020, no COVID emergency policies were in place in Ecuador and Peru, although earnings remained at lower levels than before the pandemic. In Bolivia, the effect of COVID policies is reduced at the end of 2020 and their effect at the bottom of the distribution is more in line with that of policies in Argentina, Colombia, and Uruguay, where the design of emergency programmes was maintained throughout the year. Finally, automatic stabilizers cushion household incomes mostly at the top of the distribution due to a reduction in social insurance contributions and tax payments during the pandemic.

Our contribution to the literature is twofold. First, we complement the still limited literature which compares the effect of the COVID-19 pandemic on household incomes across countries in Latin America. Comparative research is important both to assess the extent to which the pandemic affected differently countries with varying pre-pandemic conditions and to quantify the contribution of tax–benefit policies with different designs in mitigating the effect of the economic crisis. We observe, for instance, that Bolivia, although characterized by lower levels of pre-pandemic per capita GDP relative to other countries under analysis, implemented generous social assistance programmes to cushion the impact of the pandemic at the bottom of the distribution. Second, we identify a common pattern in the design of social assistance benefits in the region which prevents them from providing automatic stabilization in the event of economic crises. More precisely, the main social assistance programmes in the region are designed as proxy means-tested benefits. Therefore, earnings losses do not entitle access to social protection. This is an issue that deserves further debate by academics and policy makers, with a view to designing better social protection systems to face future crises.

The paper is divided into six sections, of which this introduction is the first. In Section 2, we present recent literature on the effects of tax–benefit policies on poverty and inequality around the world with a special focus on Latin America. In Section 3, we present the methodology and data used in our exercises, emphasizing the nowcasting exercise and the decomposition of changes in household disposable income. Section 4 presents the main results of the microsimulation exercise. Section 5 provides a validation of our nowcasting exercise and Section 6 concludes.

2 Literature review

Since the beginning of the COVID-19 pandemic, several studies have attempted to measure the poverty and distributional effects of the changes in labour market conditions. In the absence of timely household survey data, such studies have relied mostly on nowcasting techniques based on microsimulation models or on rapidly collected surveys, which contain more limited information and rely on smaller samples than household survey data.

Due to the lack of timely data containing detailed information on household income in Europe, the main approach used to assess the distributional impact of COVID-19 in the region has relied on nowcasting techniques combined with tax–benefit microsimulation. Most studies find that income poverty slightly increased during the pandemic, while inequality remained constant thanks to the role of automatic stabilizers, work compensation schemes, and COVID-related changes to taxes and benefits. For example, in their studies, Almeida et al. (2021) and O'Donoghue et al. (2020) use the European Union Statistics on Income and Living Conditions and the tax–benefit microsimulation model EUROMOD to nowcast the distribution of household income during the pandemic and analyse the impact of the crisis on household incomes in the European Union and Ireland, respectively. Brewer and Tasseva (2021) and Cantó et al. (2022) take a similar approach but, where possible, combine rapidly collected surveys from COVID-19 to update household incomes and labour market data. Then they use the tax and benefit model microsimulation to evaluate the impacts in Belgium, Italy, Spain, and the United Kingdom. Finally, Beirne et al. (2020) and Figari and Fiorio (2020) use counterfactual scenarios, for example based on information on the economic sectors forced to shut down by law in the immediate aftermath of the pandemic, to assess the degree of income protection provided by tax–benefit systems in Ireland and Italy, respectively.

A number of studies on the distributional impact of COVID-19 in Latin American countries also use nowcasting techniques in their analysis. These studies adjust pre-pandemic household surveys to reflect labour market conditions and the distribution of earnings during the pandemic and simulate tax–benefit policies introduced by the government to mitigate the effect of the economic shock. Most of studies have found that the COVID-19 pandemic has increased income poverty and inequality in the region. The studies point to significant earnings losses and show that emergency policies somewhat mitigate this effect, but not to a large extent. For instance, Corredor et al. (2021), Huesca et al. (2021), and Jara et al. (2021) use household survey data combined with tax–benefit microsimulation models to analyse the impact of the pandemic in Colombia, Mexico, and Ecuador, respectively. These studies show that earnings losses were substantial and, while COVID-related policies cushioned some of the shock at the bottom of the distribution, their overall effect was limited. Likewise, Bonavida and Gasparini (2020), Brum and De Rosa (2021), Cuesta and Pico (2020), Núñez Mendez (2020), and World Bank (2020) estimate the short-term economic impact of the COVID-19 crisis on Argentina, Uruguay, Colombia, and Brazil, respectively. The authors show that there was a significant reduction in employment, especially informal labour. Furthermore, the labour shocks reduce the average income and increase inequality, with the greatest impact being on vulnerable households.

Comparative studies assessing the distributional effects of the pandemic in the region are scarcer. Avellaneda et al. (2021) evaluate the cushioning effect of tax–benefit policies using nowcasting techniques and harmonized tax–benefit microsimulation models based on EUROMOD for the Andean region. They find that, in the absence of emergency policies, poverty incidence would have increased by 3.4, 3.0, and 0.7 percentage points in Peru, Colombia, and Ecuador, respectively, and extreme poverty incidence would have increased by 7, 3.9, and 1.2 percentage points in Peru, Colombia, and Ecuador, respectively. In addition, they find that the policies implemented by each government did not entirely mitigate the effect of the lockdowns, as the region has limited fiscal capacity compared to developed countries. Lustig et al. (2020) and Neidhöfer et al. (2021) also make use of nowcasting and simulate the effect of expanded social assistance programmes to assess the short- and long-term distributional consequences of COVID-19 in Argentina, Brazil, Colombia, and Mexico. Their results show that expanded social assistance introduced by national governments had a large compensatory effect in Brazil and Argentina but not in Colombia and Mexico.

With the growing availability of official household survey data collected during the pandemic in Latin America, some studies have assessed the impact of the pandemic based on actual data. For instance, Cueva et al. (2021) and Madeira (2021) analyse the impact of the COVID-19 crisis in Peru and Chile, respectively. Their results show that informal workers are more likely to become unemployed than formal workers, especially because the latter are more educated. They also find that in the face of a negative shock, transfers have a positive impact on economically vulnerable households.

3 Methodology and data

3.1 Data and microsimulation models

Data

Our study is based on representative household survey data from each country. The surveys used in the analysis are summarized in Table 1. All surveys contain detailed information on demographics, employment, earnings, income from capital and property, private transfers, pensions, and cash transfers. In all countries, pre-COVID household survey data correspond to the last quarter of 2019 except in Mexico, for which the latest pre-COVID data available are from 2018, and Argentina, which uses data from the first quarter of 2020. For Mexico, we update the 2018 data to 2019 using country-specific factors: consumer price index (CPI) and minimum wage changes, to reflect the situation by the end of 2019. We also update the population weights to 2019. In Argentina, data from the first quarter of 2020 are used due to high levels of inflation in the economy. Income concepts in all surveys have been harmonized to achieve comparability in the simulations.

Table 1: Data sources and microsimulation models

Country	Microsimulation model	Data sources used as input in the models	Years of data collection
Argentina	LATINMOD-Argentina	Encuesta Permanente de Hogares (EPH)[1]	2020Q1, 2020Q2, 2020Q4
Bolivia	BOLMOD	Encuesta de Hogares (EH)[2]	2019, 2020Q2, 2020Q4
Colombia	COLMOD	Gran Encuesta Integrada de Hogares (GEIH)	2019, 2020Q2, 2020Q4
Ecuador	ECUAMOD	Encuesta Nacional de Empleo, Desempleo y Subempleo de Hogares Urbanos y Rurales (ENEMDU)	2019Q4, 2020Q2, 2020Q4
Mexico	MEXMOD	Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH) survey of 2020	2018, 2020Q2, 2020Q4
Peru	PERUMOD	Encuesta Nacional de Hogares (ENAHO)	2019, 2020Q2, 2020Q4
Uruguay	LATINMOD-Uruguay	Encuesta Continua de Hogares (ECH)	2019, 2020Q2, 2020Q4

Source: authors' elaboration based on household surveys.

[1] The EPH Argentinian household survey is conducted by the National Bureau of Statistics (INDEC). The survey covers only the urban population in large agglomerates, which represent around two-thirds of the total population, and it is the one used to obtain official labour market, poverty, and income distribution indicators.

[2] In the case of Bolivia, the survey for Q2 was restricted to urban areas. As the rural activities were not dramatically affected by the pandemic, we use the rural information for Q1 in Q2.

To capture the labour market conditions and the earnings distribution during the pandemic, household survey data from the second and last quarters of 2020 are used. However, data collection was affected in many countries during the pandemic, especially during the second quarter of 2020. As a result, data from the second quarter of 2020 cannot be used directly as input data in the simulations as key variables are missing in many countries (e.g., household identifiers in the case of Ecuador, non-labour income in Colombia, etc.). Therefore, the approach taken in this study is to generate input data for the COVID simulations using nowcasting techniques, where the pre-pandemic data are adjusted to capture the labour market and earnings situation at the onset of the pandemic based on the information from surveys collected during the pandemic. Nowcasting is used for the second and last quarter of 2020. However, actual data from the last quarter of 2020 are used to validate our nowcasting exercise. In Section 3.3 we present the specificities of the nowcasting exercise.

Tax–benefit models

Our study makes use of harmonized tax–benefit microsimulation models for each of the seven countries under analysis. The models have been implemented under a common language using the EUROMOD platform to ensure cross-country comparability (Sutherland and Figari 2013). In all countries, detailed simulations of the main tax–benefit policies before (2020Q1) and during the pandemic (2020Q2 and 2020Q4) are applied to nationally representative household surveys to assess changes in the distribution of household disposable income.[3] The pre-pandemic simulations include: (i) employee and self-employed social insurance contributions; (ii) personal income tax; and (iii) the main cash transfer programmes in place in each country prior to the pandemic.[4] Additionally, the simulations for the second and last quarters of 2020 also include the main COVID-related measures implemented in each country. Table 1 summarizes the information about the models used in the analysis.

Our analysis compares the distribution of household disposable income at three points in time: the first quarter of 2020, the second quarter of 2020 (at the beginning of the lockdowns), and the last quarter of 2020. The distribution of household disposable income at the beginning of 2020 is obtained by simulating the tax–benefit policies in place at the beginning of 2020 on the pre-pandemic data. The distributions of household disposable income in the second and last quarters of 2020 are obtained by simulating tax–benefit policies in place prior to the pandemic and COVID emergency policies on nowcasted data. To account for differences in the duration of COVID-related policies, emergency cash transfers and other COVID-19 policies are transformed to a monthly basis in all countries. For instance, where there is only one cash payment within the quarter, we divide the transfer amount by three.

3.2 COVID-related tax–benefit emergency policies

To mitigate the impact of lockdowns on the economy, national governments in the countries under analysis implemented a variety of measures. In what follows, we briefly present the COVID-related tax–benefit policies simulated in each country under analysis. Table 2 summarizes the key characteristics of each programme.

[3] We use the 2020Q1 policies instead of the 2019Q4 policies as the pre-COVID baseline because many monetary values are updated at the start of the year in Latin America.

[4] The tax–benefit models of some countries also include consumption taxes, but those are not used in our exercise.

Table 2: Main COVID-related tax–benefit emergency policies

Country	Type of policy and name	Amount/rate	Duration	Targeting
Argentina	Benefit: Monetary transfers (Reinforcement)	$3,100 (US$46.5) $4,000–$6,000 (US$60–US$90)	April 2020	Beneficiaries of the main social assistance programme. Amount varies depending on the number of children.
	Benefit: Bonus for pensioners	$3,000 (US$45)	April 2020	Bonus for pensioners to reach $18,892.
	Benefit: Emergency Family Income (EFI)	$10,000 (US$150)	April–May, June–July, and August–September 2020	Unemployed, informal workers and small contributors aged 18 to 65 who did not receive other family income.
	SIC: Reduction in social security contribution	$1,956 (US$29)–$2,187 (US$33)	April 2020	Workers registered in the lowest categories of the small contributor´s regime (Monotributo).
Bolivia	Benefit: Bono Familia	Bs500 (US$72)	March 2020–June 2020	Students enrolled in the initial, primary and secondary cycles in public or private schools, and students enrolled in the alternative and special education subsystems.
	Benefit: Bono Canasta Familiar	Bs400 (US$57)	March 2020–June 2020	Elders receiving the Renta Dignidad bond, as well as mothers and children enrolled in the Bono Juana Azurduy programme, and people with disabilities.
	Benefit: Bono Universal	Bs500 (US$72)	March 2020–June 2020	People aged between 18 and 60 who did not earn income from public or private sectors and did not receive the Renta Dignidad bond or Bono Juana Azurduy.
	Benefit: Bono contra el Hambre	Bs1,000 (US$143)	December 2020–May 2021	People who did not earn income from public or private sectors, people aged between 18 and 60, people with disabilities, mothers enrolled in the Bono Juana Azurduy programme, independent affiliates of the pensions system, and workers affiliated to the Mining Cooperative System.
Colombia	Benefit: Previous Monetary transfers (Bonus)	$79,466–$165,524 (US$20–US$41) $400,000 (US$100) $160,000 (US$40)	April 2020–present	Beneficiaries of Familias en Acción. Beneficiaries of Jóvenes en Acción. Beneficiaries of Colombia Mayor.
	Benefit: Ingreso Solidario	$160,000 (US$40)	April 2020–present	Households not covered by the main social programmes.
	Benefit: Devolución del IVA	$37,500 (US$9)	April 2020–present	Beneficiaries of the main social assistance programmes, to mitigate the regressivity of value added tax on households living in poverty and extreme poverty.
	Benefit: Mecanismo de Protección al Cesante	$160,000 (US$40)	April 2020–present	Changes in the unemployment subsidy targeted to formal workers who made payments to Family Compensation Fund.

	Tax: Impuesto Solidario	15.00 %–20.00 %	April 2020–August 2020	Transitory tax for government officials or pensioners with monthly incomes higher than 10 million Colombian pesos.
	SIC: Reduction in pension contribution rates	3.00%, 0.75%, 2.25%	April 2020–June 2020	From 16.00% to 3.00% for self-employed workers. From 4.00% to 0.75% for employees. From 12.00% to 2.25% for employers.
Ecuador	Round 1: Bono de Protección Familiar	US$60	April 2020–May 2020	Rural workers or unpaid work social security regimes, earning less than US$400 per month (equivalent to the legal minimum wage) and having no household members who receive contributory or non-contributory benefits or pensions.
	Round 2: Bono de Protección Familiar	US$60	May 2020–June 2020	Household head earns less than US$501.60 per month (equivalent to the official cost of a survivor basket of food and services) and no member of the household receives contributory or non-contributory benefits or pensions.
Mexico	Benefit: Crédito a la Palabra	$25,000 (US$1,000)	April 2020–present	Single loan payment per business, to be repaid in three years with an annual interest rate of 6.5%.
Peru	Benefit: Bono Independiente	760 Soles (US$220)	April 2020	For self-employed workers in poor households.
	Benefit: Bono Yo Me Quedo en Casa	380 Soles (US$110)	April 2020	For poor households living in areas at highest sanitary risk from the pandemic.
	Benefit: Bono Rural	760 Soles (US$220)	May 2020	For poor households living in rural areas which had not received any other economic support.
	Benefit: Bono Familiar	760 Soles (US$220)	May 2020	For households without formal incomes.
Uruguay	Benefit: Monetary transfers (Reinforcement)	$879 + $377 (US$21 + US$9) AFAM PE; $1,201 up to $3,230 (US$29 up to US$77) TUS	April 2020–December 2021	Beneficiaries of main assistance programmes (Asignaciones Familiares del Plan de Equidad (AFAM PE) y Tarjeta Uruguay Social (TUS)).
	Benefit: Canasta de Emergencia Cupón TuAPP	$1,200 (US$28.6)	April 2020–present	For the unemployed or informal workers who are not beneficiaries of any other social programme.
	Benefit: Self-employed workers subsidy	$6,796 (US$162)	April 2020–July 2020	For the poorest self-employed formal workers.
	Benefit: Partial unemployment subsidy	25.00%	April 2020–present	For private formal workers with partial unemployment. It implies a 50% reduction in working time and the consequent reduction in labour income. The benefit amount is defined as 25% of gross income before reduction.
	Tax: Impuesto Sanitario de Emergencia	5.00%–20.00%	April 2020–May 2020	Transitory tax for public workers with monthly incomes higher than $120,000 (US$2,857).

Source: authors' compilation from emergency legislation for each country.

3.3 Nowcasting incomes during the pandemic

Government lockdowns affected data collection during the second quarter of 2020 in most of the countries in the region. Statistical agencies resorted to reducing sample sizes of official surveys and to conducting phone interviews, with the latter meaning that households were not asked several questions, particularly related to non-labour income. To overcome this limitation, we use nowcasting techniques: we adjust the information on earnings and labour market status in the 2019 household data to match the available information for the labour market in 2020Q2. Given the availability of complete survey data for the microsimulation models for the last quarter of 2020, we use actual data to compute some distributional indicators. However, to decompose the effect of tax–benefit policies, we require to follow 2019 observations in 2020Q4 and, therefore, for this part we nowcast 2020Q4 data.

Our approach consists of four steps. First, using the 2020 (Q2 or Q4) household survey data, we estimate the probability of having positive earnings. Second, we use the coefficients obtained in the first step to make an out-of-the-sample prediction of the probability of having earnings using the 2019Q4 data. Third, using the predicted probabilities, we move those workers less likely to keep their earnings in 2020 to unemployment until we replicate the employment levels of 2020 in the 2019 data. We refer to this step as an adjustment at the 'extensive margin'. Finally, conditional on having positive earnings (i.e. not entering unemployment), we update the individual earnings of 2019Q4 workers to match those prevailing in 2020Q2 (2020Q4). We refer to this step as an adjustment at the 'intensive margin'. The specific details of these four steps are discussed below.

In our adjustment at the extensive margin, for all countries except Uruguay, we estimate a probit model of the probability of having positive earnings. The dependent variable is equal to one if an individual aged 18 or more reports positive earnings during 2020 (Q2 or Q4), and zero otherwise. In the case of Uruguay, given the partial unemployment subsidy introduced during the pandemic, we use a multinomial model instead of a bivariate probit. The model comprises four states: not working, without unemployment subsidy; not working, with unemployment subsidy; working under partial unemployment subsidy; and working normally. The model allows us to determine whether a worker in 2019Q4 enters the new scheme or unemployment subsidy, but otherwise the methodology is the same as in the bivariate probit. In all estimations, we include as regressors a vector of demographics including age, age squared, dummies for woman, region, rural, head of the household, and education. Most of these variables are available for all countries in 2020. The estimation results are presented in Tables A1 to A4 in Appendix A.

The estimated coefficients are used in an out-of-the-sample prediction to determine whether a 2019Q4 worker has positive or zero earnings in 2020. For this, we first multiply the vector of estimated coefficients for 2020 by the vector of characteristics in 2019Q4 for those individuals aged 18 or more. Then, following Li and O'Donoghue (2014) and Avellaneda et al. (2021), we add a random component (an extraction from a standard normal density) which accounts for unobserved factors that may tip people into having earnings or not. This implies that we do not completely exclude groups with a low deterministic probability from having positive earnings.[5] Using the predicted probabilities, we sequentially move the individuals less likely to be employed to unemployment until we match the total number of workers in predefined cells in the 2020 data.[6]

[5] In the case of the multinomial model for Uruguay, we extract this random term from an extreme value distribution.

[6] The match is made for different categories of workers based on industry, formality status (formal or informal), and employment type (employee or self-employed).

For the adjustment at the intensive margin, we calculate the ratio of average earnings in 2020 to average earnings in 2019Q4 for each predefined cell (in terms of industry, formality status, and employment type). For those individuals that are predicted to remain as earners, we multiply their earnings by this ratio, which means that the average nowcasted earnings within each cell reflect mean earnings for the cell in 2020Q2. Based on the adjusted microdata for the second and fourth quarters of 2020, we run tax–benefit simulations to obtain the distribution of household disposable income. One advantage of this method is that we can compare changes in household disposable income based on deciles of the pre-pandemic distribution. The drawback is that we are only able to nowcast labour incomes, but non-labour incomes are fixed as in 2019 because of the lack of information for 2020Q2. In the case of the 2020Q4 data, we are able to make an adjustment at the intensive margin of three non-labour incomes: private transfers, income from property, and income from investment.

3.4 Decomposing changes in the distribution of household disposable income

To compare the distribution of household disposable income before and during the COVID-19 pandemic, we use the decomposition approach proposed by Bargain and Callan (2010), extended by Paulus and Tasseva (2020), and recently applied to the context of the COVID crisis in developing countries by Avellaneda et al. (2021), Jara et al. (2021), and Lastunen (2021). The approach consists of simulating three counterfactual scenarios in each country: (a) pre-pandemic tax–benefit policies applied to pre-pandemic data; (b) pre-pandemic tax–benefit policies applied to COVID data (i.e. COVID nowcasted data); and (c) tax–benefit policies in place during the pandemic, including COVID-related measures, applied to COVID data. Based on these three scenarios, we can decompose changes in the distribution of household disposable income into the contribution of: (i) earnings losses due to COVID-19; (ii) pre-COVID tax–benefit policies (i.e. automatic stabilizers); and (iii) COVID-related emergency measures implemented by the government. This section closely follows Avellaneda et al. (2021) in describing the decomposition approach.

Let y represent pre-crisis gross market income, $t(y)$ income tax and SICs, and $b(y)$ government cash transfers. Then, household disposable income in the pre-crisis baseline scenario (B) is given by:

$$B = y - t(y) + b(y) \tag{1}$$

Now, let y' represent gross market income under the crisis reflecting a scenario with higher unemployment and lower earnings, $t'(y')$ denote income tax and SICs after the drop in earnings, e.g. including newly introduced taxes, and $b'(t, y')$ represent government cash transfers after the earnings drop and benefit changes, e.g. including newly introduced cash transfers. Then, the household disposable income (D) under the crisis is given by:

$$D = y' - t'(y') + b'(y') \tag{2}$$

A welfare index, I, such as mean income or a measure of inequality or poverty, can be calculated on the basis of the distribution of disposable income under the pre-crisis and crisis scenarios. The total difference Δ in the welfare indicator I between the pre-crisis and crisis scenarios can be represented by:

$$\Delta = I[y' - t'(y') + b'(y')] - I[y - t(y) + b(y)] \tag{3}$$

The difference in the distribution of disposable income, as summarized by index I, can be decomposed into the contribution of the change in the tax–benefit rules ('policy changes effect')

and the contribution of 'other effects' not directly linked to policy changes, such as the changes in the underlying gross market income distribution due to the economic shock.[7] This can be formally represented as:

$$\Delta = \{I[y' - t'(y') + b'(y')] - I[y' - t(y') + b(y')]\} \quad \text{(policy changes)}$$
$$+ \{I[y' - t(y') + b(y')] - I[y - t(y) + b(y)]\} \quad \text{(other effects)} \qquad (4)$$

Following Paulus and Tasseva (2020), for additively decomposable measures only, such as mean incomes, we can further decompose the 'other effects' into the effect of earnings changes and the effect of automatic stabilizers. Equation (4) can be rewritten as:

$$\{I[y' - t'(y') + b'(y')] - I[y' - t(y') + b(y')]\} \quad \text{(policy changes)}$$
$$+ \{I[y'] - I[y]\} \quad \text{(earnings changes)}$$
$$+ \{I[t(y)] - I[t(y')]\} \quad \text{(taxes and social insurance contributions as automatic stabilizers)}$$
$$+ \{I[b(y')] - I[b(y)]\} \quad \text{(benefits as automatic stabilizers)} \qquad (5)$$

4 Changes in household incomes during the COVID-19 pandemic in Latin America

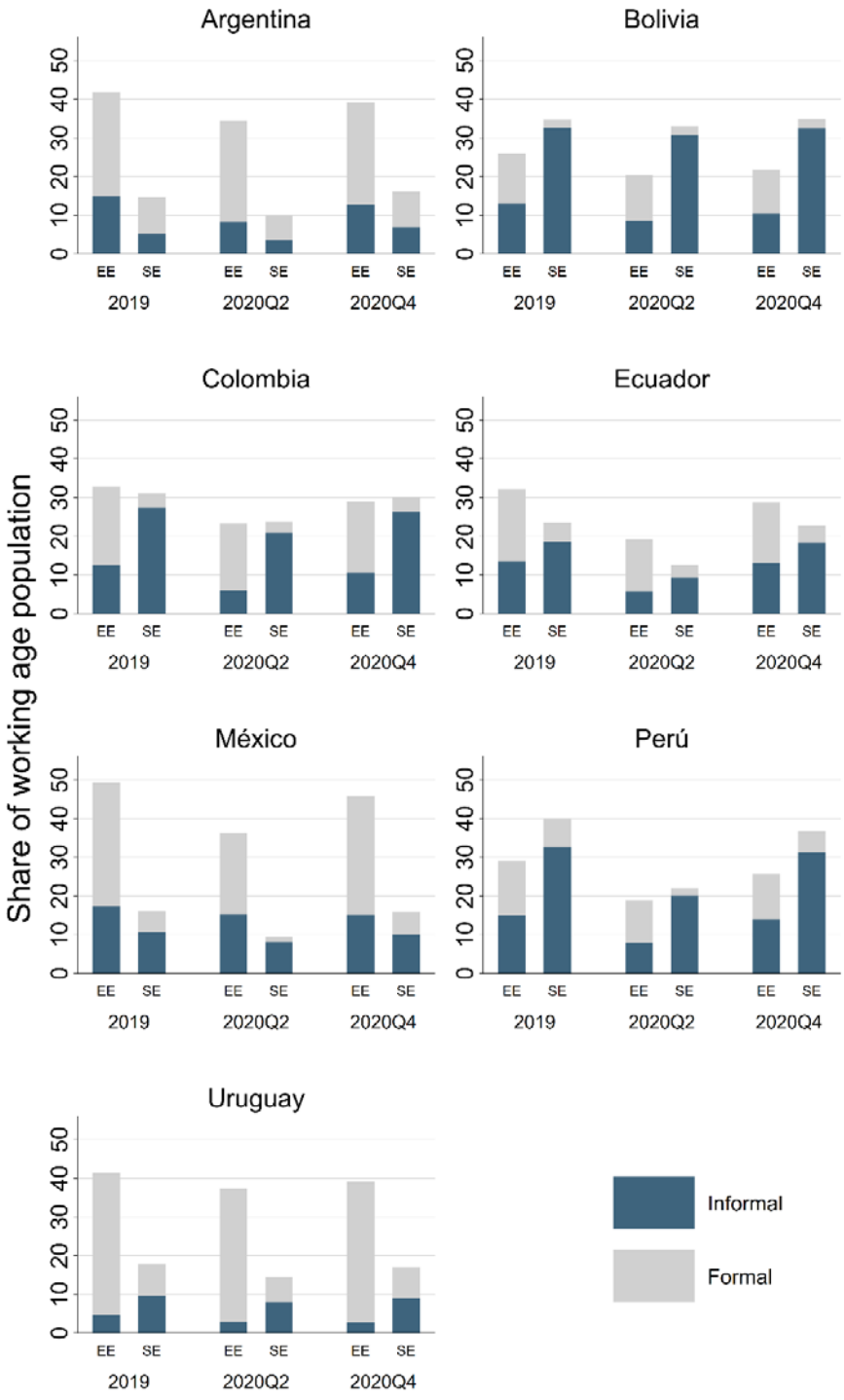
In this section, we start by analysing the changes in labour market conditions during 2020. Then we present the results of our decomposition to assess the contribution of earnings losses, automatic stabilizers, and COVID-related policies to changes in household disposable income. We discuss the results for the second quarter of 2020, then we move on to the analysis of the last quarter of 2020.

Figure 1 depicts the changes in employment experienced during the pandemic. More precisely, for our three points in time (2019Q4, 2020Q2, and 2020Q4), the figure shows the share of earners relative to the working-age population in each country, distinguishing between employees and self-employed workers by formality status (formal vs informal). The results confirm that the pandemic brought important employment losses in Latin America, both for employees and self-employed workers. In 2020Q2, and relative to the last quarter of 2019, the highest employment losses are observed in Ecuador, Peru, and Mexico, with a 43, 41, and 30 per cent drop, respectively. The countries least affected were Uruguay and Bolivia, with employment losses of around 12 per cent in both cases. Considering the divide between employees and the self-employed, and between formal and informal workers, we observe important employment losses in 2020Q2 relative to the

[7] Note that, to make monetary amounts from two periods comparable when the policies of one period are applied to the population of the other in the counterfactuals, policy parameters and/or market incomes are usually adjusted by a factor capturing the evolution in nominal levels (Bargain and Callan 2010; Paulus and Tasseva 2020). The adjustment factor becomes particularly relevant for distant periods of time. Here, we consider two consecutive years and assume that the adjustment factor equals one for all countries except Argentina given the high levels of inflation affecting the economy. For this country, we uprate policy parameters and market incomes in 2020Q1 to the corresponding Q2 and Q4 using the CPI.

last quarter of 2019 among formal employees in Mexico (-34.3 per cent) and formal self-employed workers in Peru (-74.6 per cent). In the last quarter of 2020, we observe an important recovery. However, in most countries, employment remains slightly below the pre-pandemic levels, except in Mexico where employment is 7.5 per cent above its pre-pandemic level.

Figure 1: Labour market aggregates in 2019 and 2020 (Q2 and Q4)



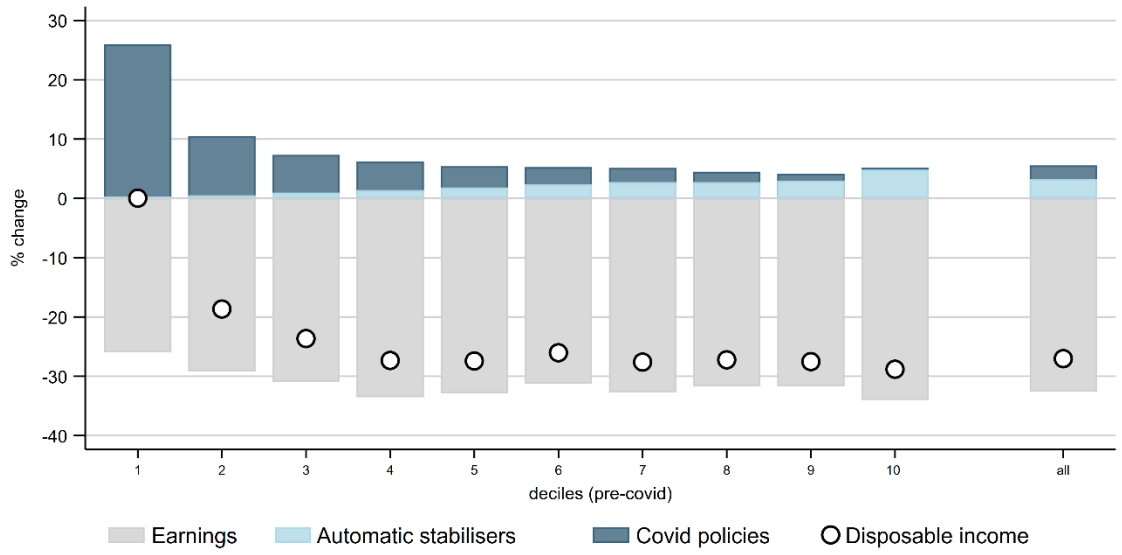
Note: 'EE' and 'SE' stand for 'employee' and 'self-employed', respectively.

Source: authors' elaboration based on household survey data.

4.1 Distributional effects at the onset of the pandemic

Figure 2 presents the main decomposition results for the changes in mean household disposable income per capita between the last quarter of 2019 and the second quarter of 2020 for the region. Changes in mean disposable income are presented by income deciles and for the whole population, where income deciles are based on per capita household disposable income in 2019Q4 in each country. Each bar represents the country-weighted average change in the component relative to disposable income in the last quarter of 2019. Weights are proportional to population in each of the seven countries.

Figure 2: Decomposition of changes in mean household disposable income in 2020Q2, by income decile in 2019 Q4. Weighted average of all countries



Note: changes in income are based on per capita household disposable income before the pandemic. The results for all countries are equivalent to the changes in each decile for each country weighted by the country´s population.

Source: authors' elaboration based on microsimulation models.

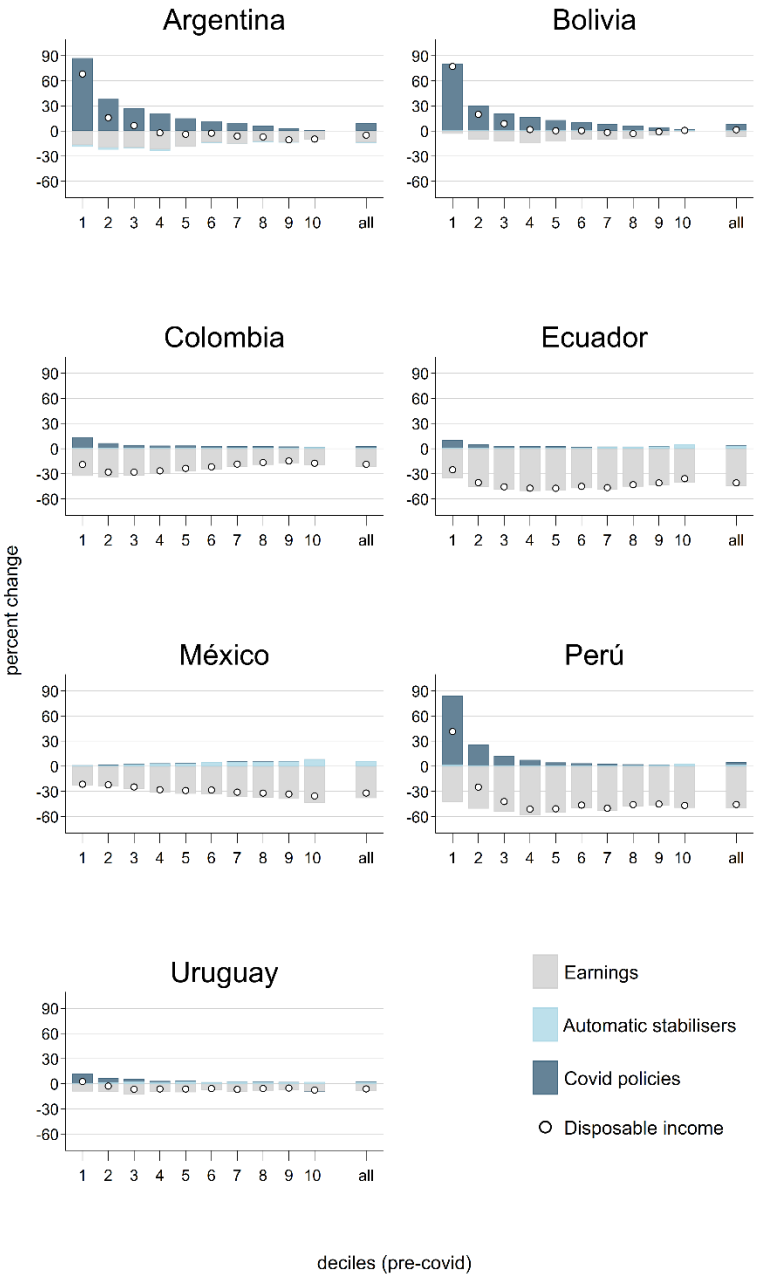
Our results show that, on average, mean disposable income (white circles) dropped by 27 per cent in the region as a whole. However, the drop was not uniform across the pre-pandemic distribution. In particular, a decreasing pattern is observed, with deciles 4, 5, and 10 being the hardest hit at the onset of the pandemic, with an average income loss close to 30 per cent. The first decile is, on average, at its pre-pandemic level meaning that, on average, households in the first decile of the distribution did not experience a change in mean household disposable income. Our decomposition allows us to assess the contribution of different income components to changes in mean disposable income. First, and as expected, we observe that earning losses (grey bars) contributed to a decrease in household disposable income. Moreover, the pattern observed for disposable income reflects to a great extent the pattern observed for earnings.[8] However, Figure 2 shows that COVID emergency policies (dark blue bars) and automatic stabilizers (light blue bars) mitigate the shock in earnings, although to different extents across the income distribution.

[8] The smaller earnings losses observed in the first income decile can be explained by the fact that household income in this decile is composed to a large extent of cash transfers and also agricultural income, which was only slightly affected by lockdowns during the pandemic.

Regarding COVID emergency policies, they have only a limited effect for the whole population (2.3 per cent of mean household income). However, COVID-related policies have an important cushioning effect at the bottom of the distribution. In fact, emergency policies offset the impact of earnings losses in the first decile of the pre-pandemic distribution in the region, highlighting the important role of these programmes in protecting the income of the poorest households. By design, the contribution of COVID-related policies decreases along the income distribution. In terms of automatic stabilizers, their effect is also limited but is larger than that of COVID emergency policies for the population as a whole (3.2 per cent of mean household income). In contrast with emergency policies, the contribution of automatic stabilizers increases with income. The pattern is explained by the decrease in social insurance contributions and personal income tax payments due to earnings losses, which are concentrated at the top due to the prevalence of informal employment at the bottom of the income distribution and the high exempted tax thresholds present in the region. The absence of automatic stabilizers for the lower part of the distribution is also explained by the fact that the main social assistance programmes in the region are designed as proxy means-tested benefits, meaning that they do not automatically entitle individuals to payments in the event of earnings losses.

The decomposition for 2020Q2 in each individual country is presented in Figure 3. The results show the important heterogeneity in terms of changes in mean disposable income, as well as the contribution of earnings losses and policy responses across the region. The results show that, on average, household disposable income increases by 2 per cent in Bolivia and decreases by 40 per cent in Ecuador and 45 per cent in Peru. In the latter two countries and Colombia, a U-shaped pattern of changes in household income across the pre-pandemic distribution is observed, whereas in the other countries, household disposable income decreases with income. In all cases, the pattern of changes in disposable income mostly reflects the contribution of earnings losses. Regarding COVID emergency policies, we observe that in all countries, except Mexico, they provide significant income protection for households at the bottom of the distribution, although to different extents. Their contribution to changes in disposable income at the bottom decile ranges between 10 per cent in Ecuador and Uruguay, close to 80 per cent in Bolivia, and 87 per cent in Argentina. Although small, the contribution of COVID-related policies in Uruguay offsets the drop in earnings in the first income decile. In Argentina, Bolivia, and Peru, COVID emergency policies more than offset the drop in earnings in the bottom decile, where, as a result, households experience an increase in mean disposable income in the second quarter of 2020. In Colombia and Ecuador, the COVID-related policies cushion the effect of earnings losses at the bottom decile but are not sufficient to offset the income shock.

Figure 3: Decomposition of changes in mean household disposable income in 2020Q2, by 2019 disposable income decile



Note: changes in income are based on per capita household disposable income before the pandemic.

Source: authors' elaboration based on microsimulation models.

The limited effect of COVID-related policies in Mexico is explained by the fact that *Crédito a la Palabra*, the only policy implemented at the time of the pandemic, was not directly designed as an expanded social assistance programme to mitigate the effect of the crisis but was instead one of the policies planned by the new government of Mexico prior to the pandemic and representing loans to small firms.

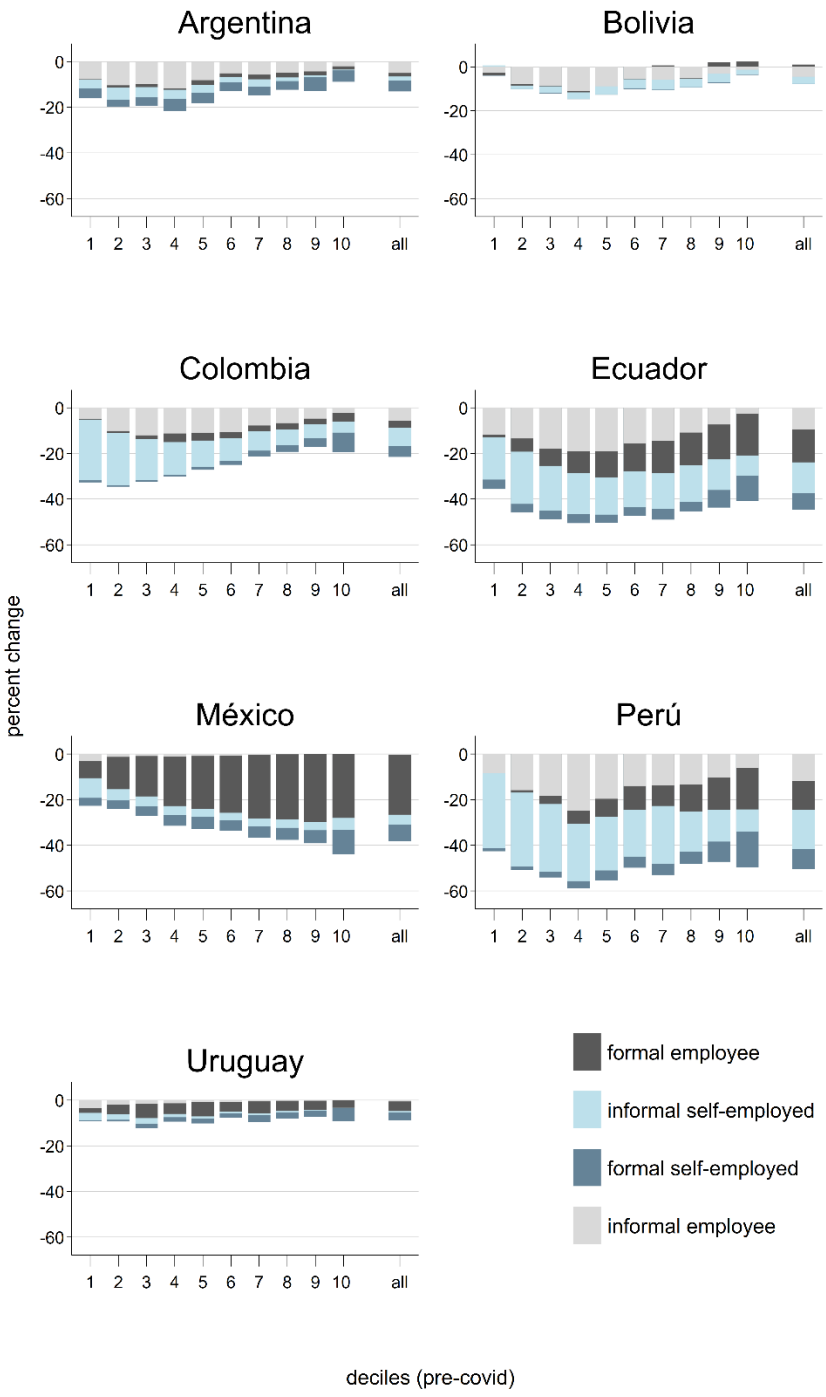
Before turning to the role of automatic stabilizers, we discuss the role of different sources of earnings in explaining the changes in mean disposable income. For this purpose, Figure 4 breaks

down the effect of earnings into the contribution of formal employment earnings, informal employment earnings, formal self-employment earnings, and informal self-employment earnings. In Colombia and Peru, the source of earnings that contributes the most to the drop in disposable income is earnings from informal self-employment. In Bolivia, informal earnings also explain the largest drop in disposable income but, in the case of this country, it is informal earnings from employees. By contrast, in Ecuador, Mexico, and Uruguay, the largest contribution to the drop in disposable income comes from formal employment earnings. The differentiated pattern of the contribution of earnings losses across the pre-pandemic distribution (U-shaped vs decreasing) can be explained by the composition of earnings losses. Countries where a U-shaped pattern is observed are characterized by larger losses in informal earnings (from employment and self-employment): Bolivia, Colombia, Ecuador, and Peru. On the contrary, in countries where a decreasing pattern is observed, formal earnings losses are more prevalent (Argentina, Mexico, and Uruguay).

Finally, Figure 5 zooms into the contribution of automatic stabilizers. More precisely, the figure breaks down the contribution of benefits, social insurance contributions, and taxes in place before the COVID-19 pandemic following equation (5). Our results show a limited role of automatic stabilizers in all countries and their effect is mostly observed at the top of the income distribution. In fact, the contribution of automatic stabilizers is noticeable mainly in Mexico, Ecuador, and Uruguay where they account for an increase in disposable income of 5.7, 2.9, and 2.1 per cent, respectively. In the case of Mexico, the largest contribution comes from reductions in tax payments, which account for a 4.5 per cent increase in disposable income. In Uruguay, the largest contribution comes from social contributions (0.9 per cent) and secondly from benefits (0.83 per cent), which is related to the important role played by unemployment insurance during the COVID-19 pandemic. In the case of Ecuador, reductions in social insurance contributions as a result of earnings losses contribute the most to the cushioning on household incomes. In Argentina, benefits contribute negatively to disposable income given the real value loss of pre-COVID transfers resulting from high inflation rates.

Three main reasons explain the limited role of automatic stabilizers in Latin America. First, the prevalence of informal work implies that a large fraction of the population does not contribute to social insurance or taxes. Second, personal income tax in many countries in the region is characterized by high exempted thresholds and generous deductions, meaning that only individuals in the top deciles contribute effectively to tax revenue. Finally, the main social assistance programmes in most Latin American countries are designed as proxy means-tested benefits. Consequently, negative income shocks are not automatically cushioned by benefits as income losses do not entitle individuals to social assistance receipts.

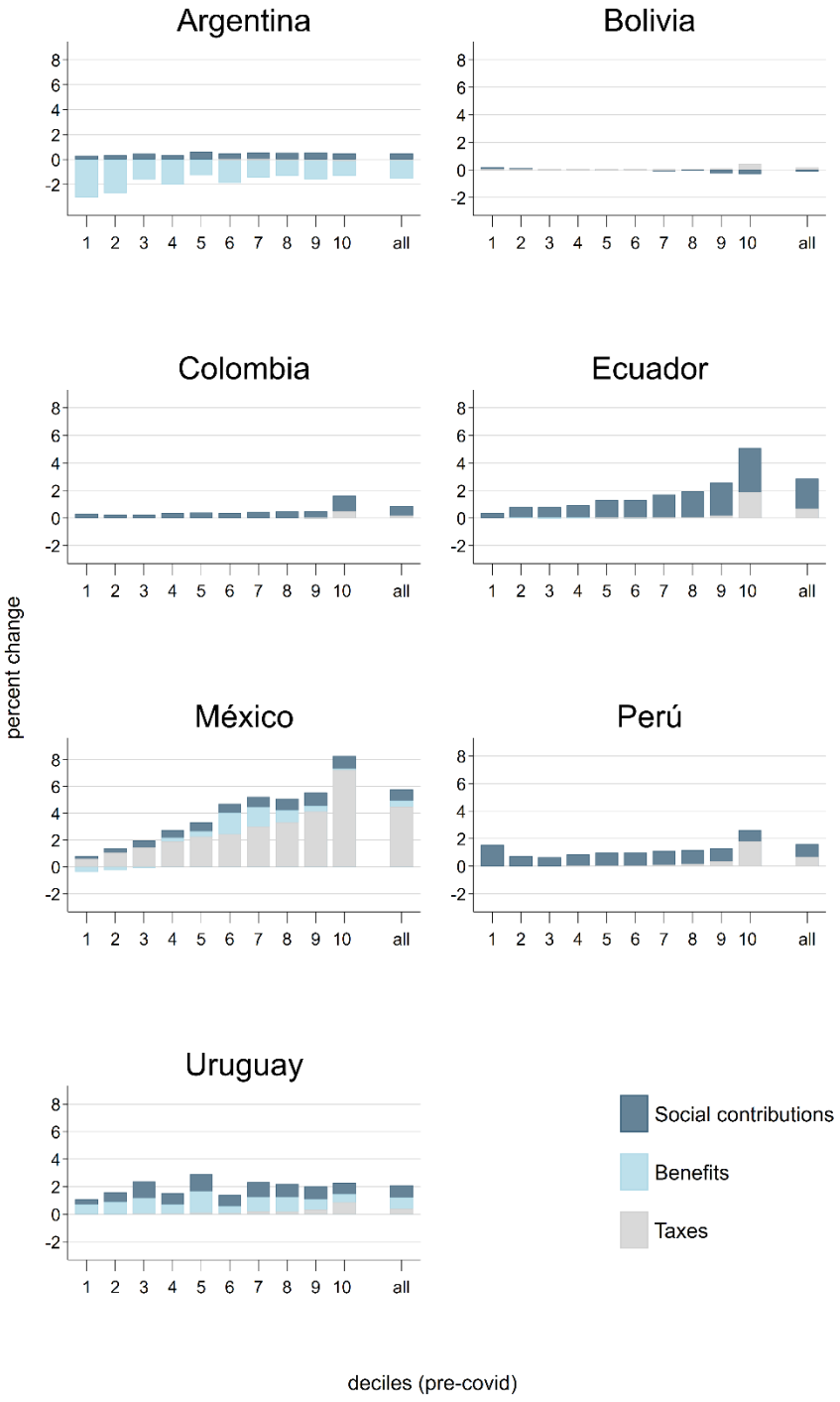
Figure 4: Decomposition of changes in earnings in 2020Q2, by 2019 disposable income decile



Note: changes in income are based on per capita household disposable income before the pandemic.

Source: authors' elaboration based on household survey data.

Figure 5: Change in disposable income due to automatic stabilizers in 2020Q2, by 2019 disposable income decile



Note: changes in income are based on per capita household disposable income before the pandemic.

Source: authors' elaboration based on microsimulation models.

The last part of this section focuses on changes in income inequality and poverty during the second quarter of 2020. Table 3 presents the main results, which are based on per capita household disposable income. For comparability, the poverty analysis uses a US$5-a-day poverty line and a US$1.9-a-day extreme poverty line. We transform theses values to local currency using USD at

purchasing power parity (PPP) for 2019 and keep these lines fixed when we assess poverty in 2020.[9] Lastly, we transform the daily lines to monthly values (i.e. we multiply the daily line by 30). Results for three scenarios are presented for each country: (i) the pre-COVID baseline; (ii) a COVID scenario but excluding COVID-related policies; and (iii) a COVID scenario which takes account of the effect of COVID policies.

The results show that income inequality increased in all countries except Argentina during the second quarter of 2020, although to different extents. Inequality measured by the Gini coefficient increases by between 2.7 per cent in Uruguay and 26.8 per cent in Ecuador. In Argentina, inequality decreases by 3.2 per cent. The results based on the Theil index are in line with those from the Gini coefficient. The results also highlight the role played by COVID emergency policies in mitigating the impact of the crisis. In all countries, inequality would have increased in the absence of the emergency policies implemented during the second quarter of 2020. In Bolivia, COVID-related policies managed to fully offset the increase in income inequality at the onset of the pandemic. In Peru, emergency policies also played an important role, where, in their absence, income inequality would have increased by an additional 3.5 percentage points.

The results further show a substantial increase in income poverty for most countries during the second quarter of 2020. In terms of moderate poverty, the pandemic increased its incidence in all countries except Argentina. The largest increase was experienced by Peru where poverty was 2.3 times higher than before the pandemic. In all countries, COVID emergency policies played an important role in mitigating the increase in poverty. In the absence of COVID-related policies, the headcount index would have increased by 50 per cent in Bolivia and would have been 2.5 times higher in Peru. Similar patterns are observed in terms of the poverty gap.

The pandemic also increased extreme poverty in the countries under analysis except in Argentina and Bolivia, with a reduction of 33 and 11 per cent, respectively. The largest increase is observed in Ecuador, where extreme poverty is seven times higher than before the pandemic. The role of COVID-related policies is important in all countries. In Bolivia, extreme poverty would have more than doubled in the absence of emergency policies, whereas it would have been 7.5 times higher in Ecuador.

[9] We use US$ PPP from the World Bank World Development Indicators (World Bank n.d.). Given the high inflation rate in Argentina, all monetary values are expressed in 2019Q4 prices for poverty measurement.

Table 3: Changes in income inequality and poverty, 2020Q2 (with and without COVID policies) and 2019 (baseline)

		Inequality		Poverty		Extreme poverty	
Country	Scenario	Gini	Theil	FGT0 (%)	FGT1 (%)	FGT0 (%)	FGT1 (%)
Argentina	Baseline	0.437	0.460	5.7	2.8	1.9	1.7
	No COVID policies	0.490	0.537	14.8	7.6	5.3	4.3
	With COVID policies	0.423	0.444	4.3	1.9	1.3	1.2
Bolivia	Baseline	0.432	0.324	15.4	7.0	4.4	2.3
	No COVID policies	0.490	0.409	23.1	13.6	10.4	7.8
	With COVID policies	0.445	0.346	17.1	7.8	3.9	1.7
Colombia	Baseline	0.508	0.500	26.8	10.9	5.4	2.2
	No COVID policies	0.580	0.597	42.6	24.4	18.8	11.2
	With COVID policies	0.570	0.568	41.2	22.8	17.1	9.8
Ecuador	Baseline	0.458	0.389	26.0	9.5	3.1	1.3
	No COVID policies	0.593	0.598	59.0	35.2	26.0	16.5
	With COVID policies	0.581	0.585	58.4	33.6	24.5	14.3
Mexico	Baseline	0.470	0.476	19.2	6.6	2.6	1.0
	No COVID policies	0.523	0.557	40.0	20.2	14.2	8.6
	With COVID policies	0.522	0.553	39.6	20.0	14.0	8.5
Peru	Baseline	0.458	0.375	22.1	10.5	6.7	3.2
	No COVID policies	0.597	0.575	56.0	36.4	30.0	20.3
	With COVID policies	0.562	0.527	52.1	31.4	24.3	15.0
Uruguay	Baseline	0.420	0.325	2.1	0.7	0.2	0.5
	No COVID policies	0.437	0.346	4.5	2.2	1.0	1.9
	With COVID policies	0.427	0.332	3.4	1.7	0.8	1.6

Note: poverty line: PPP US$5 a day and extreme poverty: PPP US$1.9 a day.

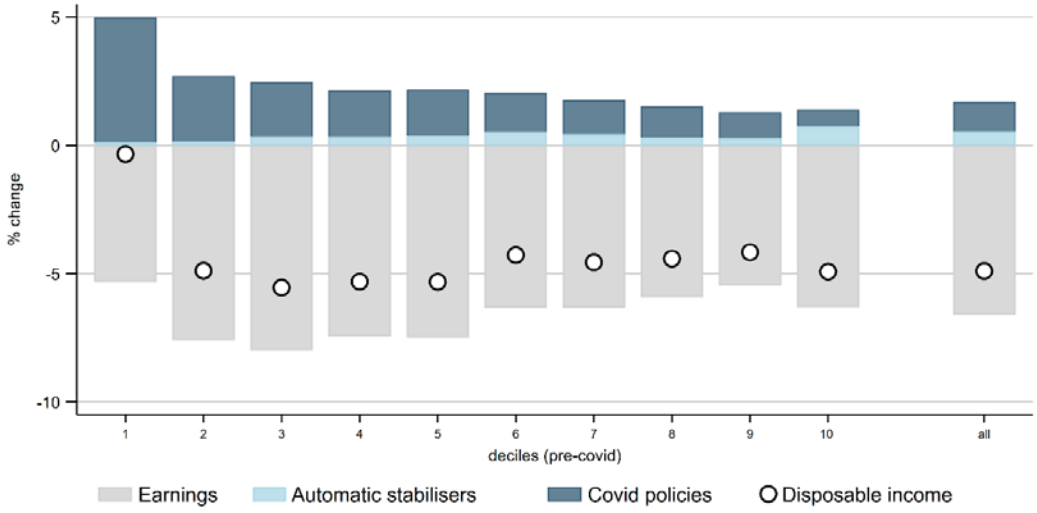
Source: authors' elaboration based on microsimulation models.

4.2 Distributional effects in the last quarter of 2020

In this section, we analyse the effect of the pandemic in the last quarter of 2020. As discussed before, this was a period of higher employment rates relative to the period of strict lockdowns during the second quarter of the year. Figures 6 and 7 present the decomposition exercise for the last quarter of 2020. As previously mentioned, for consistency with the results in the previous section, we nowcast incomes for the first part of this exercise to assess changes in disposable income at the end of the year. For inequality and poverty we use actual data for 2020Q4.

Figure 6 shows the results of the decomposition of mean disposable income for the region as a whole, weighted by the country's population. Our results show that, on average, mean disposable income drops by 5 per cent (compared to 27 per cent in the second quarter), confirming that the economy recovers but not fully. Changes in disposable income display a U-shaped pattern across the pre-pandemic income distribution. In the bottom decile, we observe almost no change in disposable income as a result of increasing earnings and the ending of COVID emergency policies in most countries. At the top of the distribution, automatic stabilizers contribute the most to changes in disposable income. However, their effect is more limited than during the second quarter of 2020 because of the smaller decrease in earnings.

Figure 6**:** Decomposition of changes in mean household disposable income in 2020Q4, by income decile in 2019Q4. Weighted average of all countries

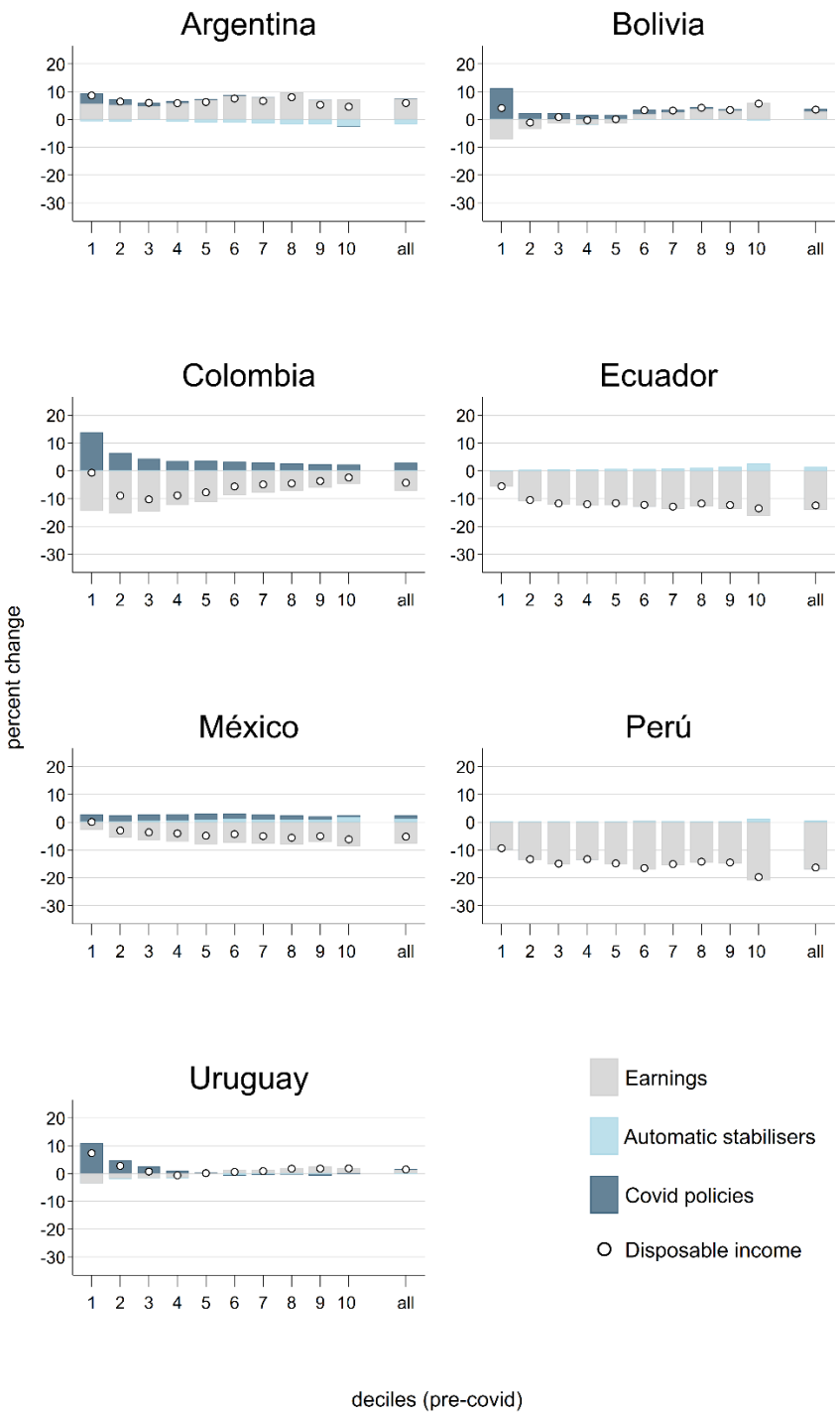


Note: changes in income are based on per capita household disposable income before the pandemic. The results for all countries are equivalent to the changes in each decile for each country weighted by the country´s population.

Source: authors' elaboration based on microsimulation models.

Figure 7 shows that the large degree of heterogeneity across countries persists. On average, mean disposable income increases in Argentina, Bolivia, and Uruguay at the end of 2020. In all other countries, we observe a drop in mean income relative to the pre-pandemic levels but it is much smaller than during the second quarter of 2020. In fact, the largest change is observed in Peru, representing a 16.3 per cent drop in disposable income. In all countries, except Bolivia, Colombia, and Uruguay, we observe a decreasing pattern in the change of disposable income across the pre-pandemic distribution. In Colombia and Uruguay, a U-shaped pattern is observed, whereas Bolivia shows an increasing pattern. In all countries, the effect of automatic stabilizers is reduced due to the smaller earnings losses experienced at the end of 2020. The figure also illustrates the decision of governments to maintain or not the emergency policies implemented during the pandemic. In particular, no COVID emergency policies were in place in Ecuador and Peru during the last quarter of 2020 despite the persistence of earnings losses. In all other countries, some or most emergency programmes were maintained, which explains the cushioning effect observed at the bottom of the distribution. Additional information on the decomposition of earnings losses and automatic stabilizers at the end of 2020 are presented in Figures B1 and B2 in the Appendix.

Figure 7: Decomposition of changes in mean household disposable income in 2020Q4, by 2019 income decile



Note: changes in income are based on per capita household disposable income before the pandemic.

Source: authors' elaboration based on microsimulation models.

Finally, Table 4 presents poverty and inequality indicators for the baseline and COVID scenario with and without COVID emergency policies. The results, based on actual 2020Q4 data, show that, by the end of 2020, income inequality measured by the Gini coefficient returns to its pre-pandemic levels or slightly decreases in Argentina, Bolivia, Mexico, and Uruguay. Income

inequality remains higher than before the pandemic in Colombia, Ecuador, and Peru, where the Gini coefficient is 5, 6, and 9 per cent higher, respectively, than the pre-pandemic levels.

In the case of poverty, we observe a decrease in its incidence in Bolivia, Mexico, and Uruguay, whereas the headcount index remains above the pre-pandemic levels in the other countries. A similar pattern is observed in terms of extreme poverty. COVID emergency policies continue to play a role in mitigating the effect of the crisis on income poverty and inequality, highlighting the importance of maintaining them throughout the year, which was the option taken by all governments except those from Ecuador and Peru.

Table 4: Changes in income inequality and poverty 2020Q4 (with and without COVID policies) and 2019 (baseline)

		Inequality		Poverty		Extreme poverty	
Country	Scenario	Gini	Theil	FGT0 (%)	FGT1 (%)	FGT0 (%)	FGT1 (%)
Argentina	Baseline	0.437	0.460	5.7	2.8	1.9	1.7
	No COVID policies	0.436	0.318	10.6	4.8	2.6	2.2
	With COVID policies	0.433	0.313	10.3	4.5	2.6	2.2
Bolivia	Baseline	0.432	0.324	15.4	7.0	4.4	2.3
	No COVID policies	0.473	0.405	20.0	9.6	6.8	3.6
	With COVID policies	0.429	0.335	12.1	4.3	1.5	0.4
Colombia	Baseline	0.508	0.500	26.8	10.9	5.4	2.2
	No COVID policies	0.538	0.550	33.7	15.1	9.0	4.1
	With COVID policies	0.532	0.538	31.9	13.8	7.4	3.4
Ecuador	Baseline	0.458	0.389	26.0	9.5	3.1	1.3
	No COVID policies	0.486	0.448	34.9	14.3	6.0	2.5
	With COVID policies	0.486	0.448	34.9	14.3	6.0	2.5
Mexico	Baseline	0.470	0.476	19.2	6.6	2.6	1.0
	No COVID policies	0.440	0.403	17.9	5.7	1.6	0.6
	With COVID policies	0.436	0.396	17.0	5.3	1.6	0.6
Peru	Baseline	0.458	0.375	22.1	10.5	6.7	3.2
	No COVID policies	0.499	0.459	31.9	14.9	9.2	4.7
	With COVID policies	0.499	0.459	31.9	14.9	9.2	4.7
Uruguay	Baseline	0.420	0.325	2.1	0.7	0.2	0.5
	No COVID policies	0.412	0.312	2.2	0.8	0.3	0.3
	With COVID policies	0.408	0.309	1.8	0.6	0.2	0.3

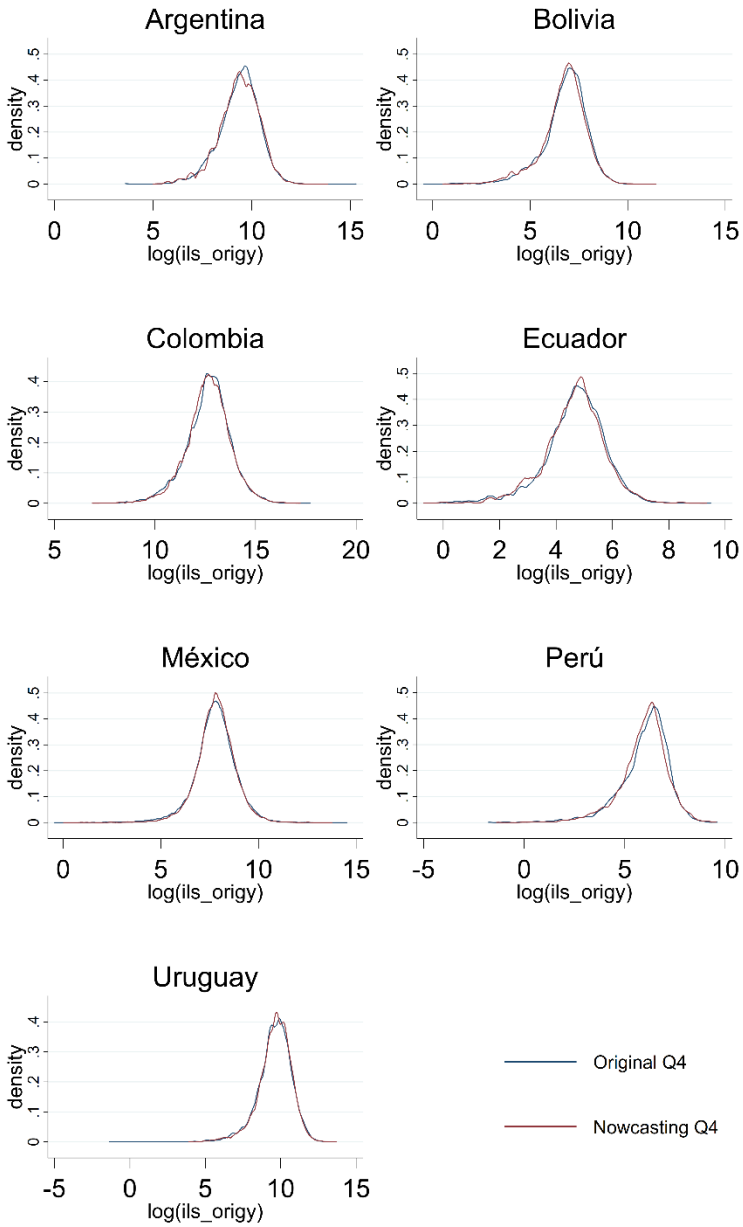
Note: poverty line: PPP US$5 a day and extreme poverty: PPP US$1.9 a day.

Source: authors' elaboration based on microsimulation models.

5 Validation

In this section we validate our nowcasting results. Whereas we do not have all the information to recreate household incomes for 2020Q2, we do have a complete input dataset for Q4. Therefore, we compare the income distribution of our nowcasting exercise and actual data for this quarter to determine whether the proposed technique brings a plausible representation of the income distribution in situations such as Q2, where not all income components were available. The results of this validation are presented in Figure 8 and Table 5.

Figure 8: Comparison of market income distributions for the nowcasting in Q4 and the actual Q4 data



Source: authors' elaboration based on household surveys.

From Figure 8, we observe that the kernel estimates for the natural logarithm of market incomes in the nowcasted data and the actual 2020Q4 data are quite similar in all countries. The nowcasting fails to capture some of the lower part of the income distribution in Uruguay and some of the upper part of the income distribution in Argentina. For other countries, the two distributions overlap almost everywhere. To further verify the validity of our nowcasting approach, Table 5 presents inequality and poverty measures obtained with the disposable income of the nowcasted data and the actual data. In both cases, we use the tax–benefit policies as of the last quarter of 2020, i.e. they include emergency policies still available at the end of the year.

Table 5: Changes in income inequality and poverty 2020Q4 and 2020Q4 using nowcasting

		Inequality		Poverty		Extreme poverty	
Country	Data	Gini	Theil	FGT0 (%)	FGT1 (%)	FGT0 (%)	FGT1 (%)
Argentina	Original Q4	0.433	0.313	11.1	4.8	2.6	2.2
	Nowcasting Q4	0.452	0.461	11.5	5.4	3.5	3.0
Bolivia	Original Q4	0.429	0.335	12.1	4.3	1.5	0.4
	Nowcasting Q4	0.460	0.362	18.2	9.2	6.3	3.9
Colombia	Original Q4	0.532	0.538	31.9	13.8	7.4	3.4
	Nowcasting Q4	0.533	0.531	31.2	14.6	8.8	4.5
Ecuador	Original Q4	0.486	0.448	34.9	14.3	6.0	2.5
	Nowcasting Q4	0.480	0.413	33.6	14.5	7.4	4.2
Mexico	Original Q4	0.436	0.396	17.0	5.3	1.6	0.6
	Nowcasting Q4	0.472	0.475	21.5	7.6	3.1	1.4
Peru	Original Q4	0.499	0.459	31.9	14.9	9.2	4.7
	Nowcasting Q4	0.483	0.405	30.1	15.9	11.3	6.2
Uruguay	Original Q4	0.408	0.309	1.8	0.6	0.2	0.3
	Nowcasting Q4	0.429	0.336	2.9	1.3	0.7	1.1

Note: poverty line: PPP US$5 a day and extreme poverty: PPP US$1.9 a day.

Source: authors' elaboration based on microsimulation models.

Countries such as Peru, Ecuador, and Colombia show remarkably similar results in terms of the Gini coefficient between both sets of data. On the other hand, Bolivia and Mexico are off by 3.1 and 3.6 Gini points, with the rest of the countries in between. In terms of moderate poverty, Argentina and Colombia show a negligible difference in head count ratios between the two datasets, while Bolivia and Mexico are 5.6 and 4.5 percentage points off between datasets. Lastly, Argentina and Ecuador show very similar results in terms of extreme poverty between the two datasets, while the results for Bolivia and Peru are the most dissimilar, with 3 and 1.9 percentage points of difference in incidence. We found that poverty and inequality from nowcasted data are in most of the cases above actual data. This is probably a result of our technique targeting only earnings and just a few non-labour income variables. To conclude, we consider that our nowcasting exercise does a relatively good job of recreating the situation in 2020 but it could be improved to further reconcile the observed discrepancies.

6 Conclusion

This paper seeks to analyse the distributional effects of COVID-19 and the corresponding lockdowns in seven Latin American countries. We use EUROMOD-based tax–benefit microsimulation models and representative household survey data to decompose the total change in disposable income between 2019 and 2020 Q2 and between 2019 and 2020 Q4 into changes in market incomes, emergency policies, and automatic stabilizers. Given the lack of comprehensive data for the second quarter of 2020 for most of the countries in the region, we resort to nowcasting data, adjusting the 2019 data in terms of employment level and earnings level to mimic the situation in 2020Q2. We use actual data and data resulting from nowcasting for 2020Q4.

Our results show a great deal of heterogeneity between countries in terms of earnings losses and the effect of tax–benefit policies. For the second quarter of 2020, we find that emergency policies are mostly targeted at households at the bottom of the income distribution. They have different degrees of generosity, ranging from a close to null effect in Mexico to 80 per cent of pre-pandemic disposable income for the first decile in Bolivia and 87 per cent in Argentina. These policies mainly consisted of cash transfers and are poverty and inequality reducing. They represent only 2.3 per cent of pre-pandemic disposable income. Automatic stabilizers on the other hand have a reduced role in terms of poverty given the high labour informality rate and the lack of means-tested benefits in most countries in the region. They represent, on average, an additional 3.1 per cent of pre-pandemic disposable income. Their effect is more noticeable at the top of the income distribution for countries such as Mexico, Uruguay, and Ecuador.

Our contribution to the analysis of the distributional effects of COVID-19 is twofold. First of all, this paper is the first analysis of the effects of the pandemic and the tax–benefit system on household incomes for a large number of countries in Latin America. In that sense, the common language for the tax–benefit models allows us to present results in a comparative manner, using equivalent income definitions. Second, our ability to recreate policies as functions of market incomes allows us to separate the pandemic effects of automatic stabilizers. To the best of our knowledge, this is the first time that the cushioning role of the tax–benefit system in place before the pandemic is analysed in several Latin American countries. The lack of important automatic stabilizers that we found indicates the precariousness of the tax–benefit system in most countries in the region and is an invitation to carefully re-think social protection in Latin America, especially given the high prevalence of labour informality in most countries. We consider that the region requires a re-evaluation of the role of means-tested benefits as a way to cushion household incomes in future economic crises.

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Appendix A

Table A1: Marginal effects of probit estimates for the nowcasting exercise Q2

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Argentina	Bolivia	Colombia	Ecuador	Mexico	Peru
Gender (male)	0.136***	0.115***	0.174***	0.142***	0.156***	0.179***
	(0.00512)	(0.00582)	(0.00425)	(0.00566)	(0.00688)	(0.00700)
Age (21–30)	0.278***	0.214***	0.224***	0.200***	0.250***	0.156***
	(0.0136)	(0.0109)	(0.00852)	(0.0131)	(0.0150)	(0.0129)
Age (31–40)	0.424***	0.382***	0.326***	0.287***	0.320***	0.250***
	(0.0136)	(0.0114)	(0.00894)	(0.0135)	(0.0152)	(0.0134)
Age (41–50)	0.438***	0.393***	0.324***	0.279***	0.294***	0.267***
	(0.0138)	(0.0120)	(0.00928)	(0.0138)	(0.0157)	(0.0139)
Age (51–60)	0.361***	0.336***	0.276***	0.217***	0.200***	0.234***
	(0.0144)	(0.0128)	(0.00938)	(0.0144)	(0.0166)	(0.0144)
Age (>60)	-0.0381**	0.0558***	0.0253***	0.00604	-0.0856***	0.0787***
	(0.0152)	(0.0127)	(0.00882)	(0.0149)	(0.0181)	(0.0139)
Household head	0.115***	0.291***	0.136***	0.187***	0.122***	0.265***
	(0.00572)	(0.00641)	(0.00463)	(0.00647)	(0.00773)	(0.00811)
Highest education (primary)	0.0746***	0.00309	0.0780***		0.0291*	0.0589***
	(0.0136)	(0.0131)	(0.0105)		(0.0157)	(0.0155)
Highest education (secondary)	0.101***	0.0386***	0.101***	0.0566***	0.0648***	0.0545***
	(0.0135)	(0.0118)	(0.0114)	(0.0150)	(0.0150)	(0.0151)
Highest education (post secondary)	0.161***	0.0169*	0.127***	0.0814***	0.0907***	
	(0.0126)	(0.00878)	(0.0106)	(0.0155)	(0.0152)	
Highest education (tertiary)	0.312***	0.00636		0.142***	0.136***	0.172***
	(0.0131)	(0.00821)		(0.0161)	(0.0148)	(0.0162)
Region (rural)		0.0885***	0.108***	0.0727***		0.119***
		(0.00692)	(0.00708)	(0.00584)		(0.00728)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,361	29,124	47,879	26,692	19,323	21,763
Pseudo R-2	0.210	0.201	0.140	0.134	0.0908	0.205

Note: positive outcome: having earnings in 2020. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' elaboration based on household survey data.

Table A2: Multinomial logit estimates for the nowcasting exercise Q2, Uruguay

	Outcome 2	Outcome 3	Outcome 4
VARIABLES	Employed but partial unemployment subsidy	No earnings and no unemployment subsidy	No earnings but unemployment subsidy
Gender (male)	0.63	0.57***	-0.02
	(0.44)	(0.14)	(1.01)
Age (21–30)	2.19***	1.83***	2.12***
	(0.37)	(0.11)	(0.74)
Age (31-40)	2.57***	2.55***	2.70***
	(0.37)	(0.11)	(0.74)
Age (41–50)	2.42***	2.63***	2.71***
	(0.37)	(0.11)	(0.73)
Age (51–60)	1.99***	2.12***	2.22***
	(0.38)	(0.11)	(0.74)
Age (>60)	-0.75*	-0.35***	-1.99**
	(0.41)	(0.12)	(1.01)
Household head	0.39***	0.56***	0.46***
	(0.08)	(0.03)	(0.14)
Region (rural)	-0.91***	-0.26***	-1.64**
	(0.31)	(0.09)	(0.72)
Highest education (primary)	1.41***	0.79***	14.49
	(0.30)	(0.07)	(418.10)
Highest education (lower secondary)	1.74***	0.99***	14.43
	(0.29)	(0.07)	(418.10)
Highest education (upper secondary)	1.98***	1.22***	14.91
	(0.29)	(0.07)	(418.10)
Highest education (post secondary)	1.89***	1.23***	14.86
	(0.30)	(0.08)	(418.10)
Highest education (tertiary)	1.51***	1.51***	14.99
	(0.29)	(0.07)	(418.10)
Constant	-6.01***	-3.04***	-20.21
	(0.46)	(0.13)	(418.10)
Region dummies	Yes	Yes	Yes
Observations	30,496	30,496	30,496
Pseudo R-squared	0.236	0.236	0.236

Note: standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' elaboration based on household survey data.

Table A3: Marginal effects of probit estimates for the nowcasting exercise Q4

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Argentina	Bolivia	Colombia	Ecuador	Mexico	Peru
Gender (male)	0.213***	0.298***	0.229***	0.208***	0.242***	0.185***
	(0.00433)	(0.00473)	(0.00246)	(0.00659)	(0.00208)	(0.00358)
Age (21–30)	0.259***	0.251***	0.241***	0.260***	0.176***	0.166***
	(0.0101)	(0.0118)	(0.00564)	(0.0122)	(0.00407)	(0.00719)
Age (31–40)	0.447***	0.453***	0.343***	0.378***	0.234***	0.241***
	(0.0102)	(0.0116)	(0.00581)	(0.0128)	(0.00422)	(0.00743)
Age (41–50)	0.464***	0.487***	0.322***	0.353***	0.213***	0.258***
	(0.0102)	(0.0123)	(0.00600)	(0.0134)	(0.00439)	(0.00762)
Age (51–60)	0.355***	0.417***	0.242***	0.270***	0.105***	0.211***
	(0.0107)	(0.0131)	(0.00616)	(0.0142)	(0.00474)	(0.00796)
Age (>60)	-0.0364***	0.169***	-0.0880***	-0.0396***	-0.209***	-0.00304
	(0.0111)	(0.0134)	(0.00598)	(0.0133)	(0.00475)	(0.00790)
Household head			0.153***	0.238***	0.173***	0.263***
			(0.00266)	(0.00753)	(0.00231)	(0.00401)
Highest education (primary)	0.110***	-0.0285	0.0911***	0.135**	0.0543***	0.0441***
	(0.0116)	(0.0182)	(0.00683)	(0.0610)	(0.00448)	(0.00790)
Highest education (secondary)	0.143***	0.000127	0.108***	0.0814***	0.0758***	0.0465***
	(0.0116)	(0.0132)	(0.00730)	(0.0159)	(0.00469)	(0.00773)
Highest education (post secondary)	0.159***	-0.0219**	0.116***	0.107***	0.0905***	
	(0.0108)	(0.00897)	(0.00684)	(0.0165)	(0.00497)	
Highest education (tertiary)	0.331***	-0.0487***		0.125***	0.103***	0.148***
	(0.0114)	(0.00907)		(0.0173)	(0.00495)	(0.00823)
Region (rural)		-0.0193***	0.0394***	-0.0441***	0.00851***	0.0535***
		(0.00741)	(0.00405)	(0.00674)	(0.00197)	(0.00385)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,502	24,340	134,649	21,651	219,913	81,271
Pseudo R-2	0.251	0.191	0.183	0.206	0.183	0.178

Note: positive outcome: having earnings in 2020. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' elaboration based on household survey data.

Table A4: Multinomial logit estimates for the nowcasting exercise Q4, Uruguay

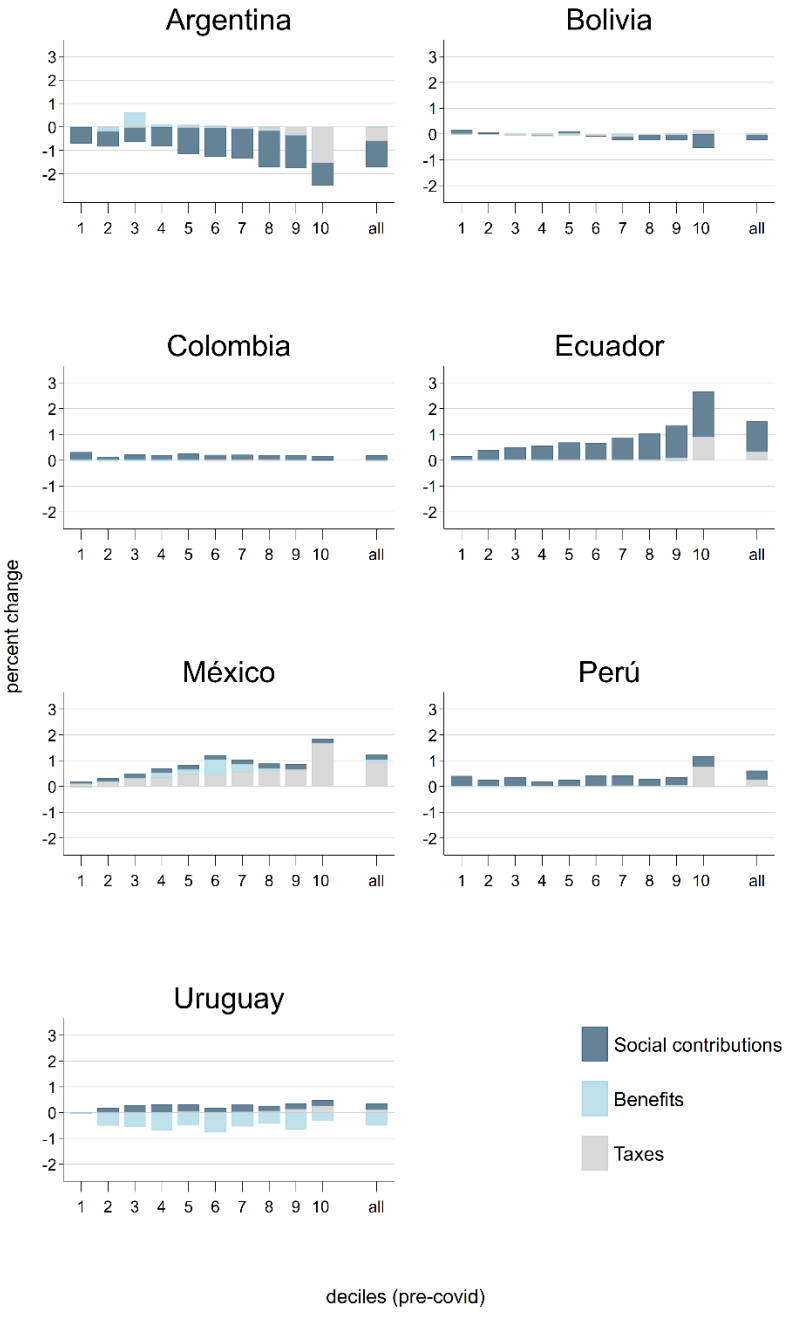
VARIABLES	Outcome 2 Employed but partial unemployment subsidy	Outcome 3 No earnings and no unemployment subsidy	Outcome 4 No earnings but unemployment subsidy
Gender (male)	-0.75***	-1.31*	-1.29
	(0.14)	(0.70)	(5,054.34)
Age (21–30)	-2.02***	-0.64	15.88
	(0.12)	(0.50)	(3,846.24)
Age (31–40)	-2.92***	-0.76	16.87
	(0.12)	(0.49)	(3,846.24)
Age (41–50)	-2.92***	-0.90*	16.51
	(0.12)	(0.49)	(3,846.24)
Age (51–60)	-2.42***	-0.58	16.97
	(0.12)	(0.49)	(3,846.24)
Age (>60)	0.14	-1.05*	16.12
	(0.12)	(0.55)	(3,846.24)
Household head	-0.55***	-0.27**	0.26
	(0.03)	(0.11)	(0.17)
Highest education (primary)	-0.63***	-0.11	15.03
	(0.07)	(0.34)	(1,443.11)
Highest education (secondary)	-0.88***	0.09	16.00
	(0.07)	(0.33)	(1,443.11)
Highest education (post secondary)	-1.10***	-0.07	16.45
	(0.07)	(0.33)	(1,443.11)
Highest education (tertiary)	-1.13***	-0.05	16.20
	(0.07)	(0.33)	(1,443.11)
Region (rural)	-1.42***	-0.92***	15.44
	(0.07)	(0.34)	(1,443.11)
Constant	0.40***	-1.35**	-16.81
	(0.08)	(0.60)	(1,976.94)
Observations	32,499	32,499	32,499
Pseudo R-2	0.280	0.280	0.280

Note: standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' elaboration based on household survey data.

Appendix B

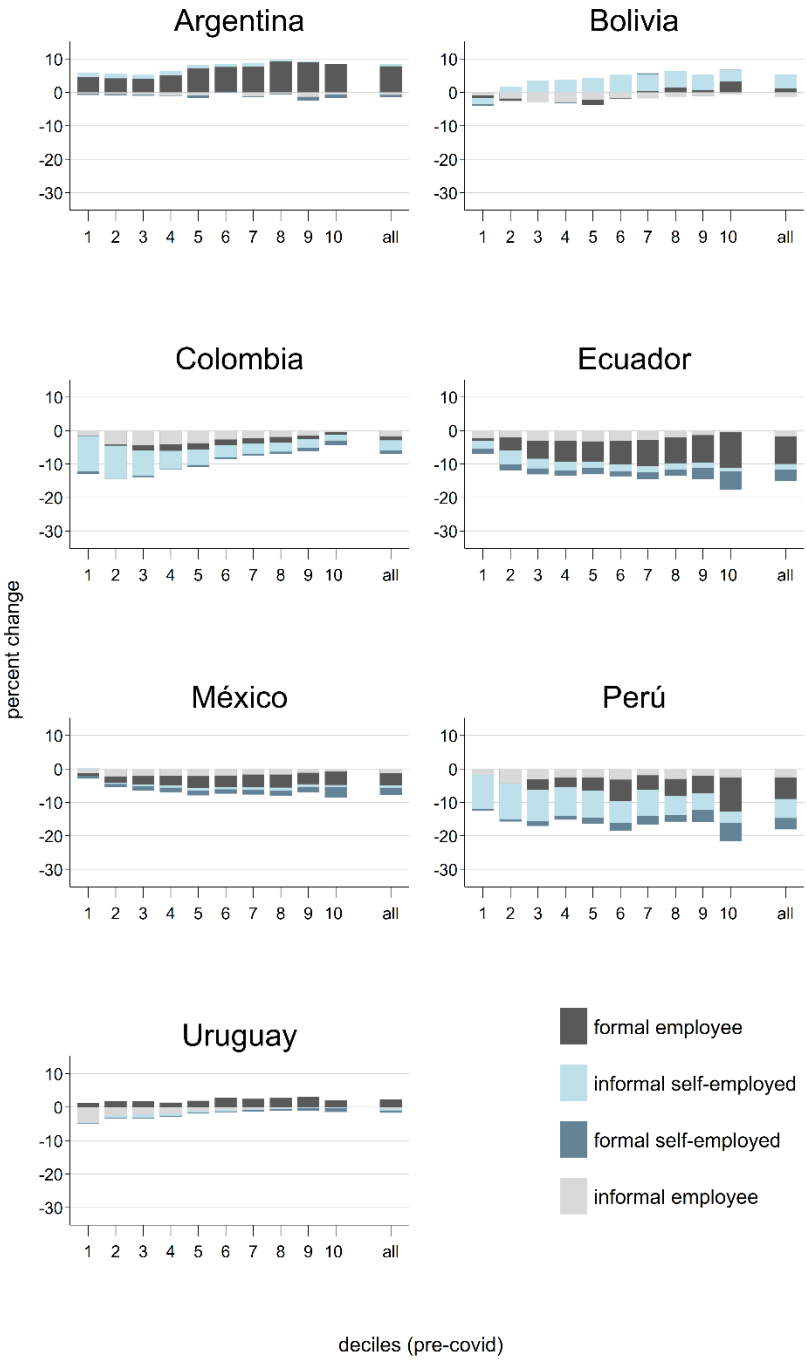
Figure B1: Change in disposable income due to automatic stabilizers in 2020Q4, by 2019 disposable income decile



Note: changes in income are based on per capita household disposable income before the pandemic.

Source: authors' elaboration based on microsimulation models.

Figure B2: Decomposition of changes in earnings in 2020Q4, by 2019 disposable income decile



Note: changes in income are based on per capita household disposable income before the pandemic.

Source: authors' elaboration based on household survey data.