SOUTHMOD

Country report

Ecuador

ECUAMOD v2.0
2011–20

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About the project

SOUTHMOD – simulating tax and benefit policies for development

SOUTHMOD is a joint project between the United Nations University World Institute for Development Economics Research (UNU-WIDER), the European Union Tax–Benefit Microsimulation Model (EUROMOD) team at the Institute for Social and Economic Research (ISER) at the University of Essex, and Southern African Social Policy Research Insights (SASPRI) in which tax–benefit microsimulation models for selected developing countries are being built. These models enable researchers and policy analysts to calculate, in a comparable manner, the effects of taxes and benefits on household incomes and work incentives for the population of each country.

SOUTHMOD models are currently available for Ecuador (ECUAMOD), Ethiopia (ETMOD), Ghana (GHAMOD), Mozambique (MOZMOD), Namibia (NAMOD), Viet Nam (VNMOD), South Africa (SAMOD), Tanzania (TAZMOD), Uganda (UGAMOD), and Zambia (MicroZAMOD). SOUTHMOD models are updated to recent policy systems using national household survey data. This report documents ECUAMOD, the SOUTHMOD model developed for Ecuador. This work was carried out by the ISER in collaboration with the Facultad Latinoamericana de Ciencias Sociales (FLACSO Ecuador).

The results presented in this report are derived using ECUAMOD version 2.0 running on EUROMOD software. The report describes the different tax–benefit policies in place, how the microsimulation model picks up these different provisions, and the database on which the model runs. It concludes with a validation of ECUAMOD results against external data sources. For further information on access to ECUAMOD and other SOUTHMOD models see the SOUTHMOD page.

The ECUAMOD model and its documentation in this country report has been prepared within the UNU-WIDER project on 'SOUTHMOD—simulating tax and benefit policies for development', which is part of a larger research project on 'The economics and politics of taxation and social protection'. For more information, see the SOUTHMOD project page.

The United Nations University World Institute for Development Economics Research provides economic analysis and policy advice with the aim of promoting sustainable and equitable development. The Institute began operations in 1985 in Helsinki, Finland, as the first research and training centre of the United Nations University. Today it is a unique blend of think tank, research institute, and UN agency—providing a range of services from policy advice to governments as well as freely available original research.

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Acronyms

ANDA	National Statistical Data and Metadata Archive (*Archivo Nacional de Datos y Metadatos Estadísticos*)
COICOP	Classification of Individual Consumption According to Purpose
CPI	Consumer price index
ENEMDU	National Survey of Employment, Underemployment, and Unemployment (*Encuesta Nacional de Empleo, Desempleo y Subempleo*)
ENIGHUR	National Survey of Income and Expenditures of Urban and Rural Households (*Encuesta Nacional de Ingresos y Gastos de Hogares Urbanos y Rurales*)
FPG	Family Protection Grant (*Bono de Protección Familiar*)
HDI	Household disposable income
HDT	Human Development Transfer (*Bono de Desarrollo Humano*)
IESS	Ecuadorian Institute of Social Security (*Instituto Ecuatoriano de Seguridad Social*)
ILO	International Labour Office (*Oficina Internnacional del Trabajo)*
INEC	National Institute of Statistics and Census (*Instituto Nacional de Estadística y Censos*)
ISD	Tax on international money transfers (*Impuesto a la Salida de Divisas*)
ISSPOL	Institute of Social Security of the National Police (*Instituto de Seguridad Social de la Policía Nacional*)
ISSFA	Institute of Social Security of the Armed Forces (*Insituto de Seguridad Social de las Fuerzas Armadas*)
LRTI	Law of Internal Tax Regime (*Ley de Régimen Tributario Interno*)
MEF	Ministy of Economy and Finance (*Ministerio de Economía y Finanzas*)
MIES	Ministry of Social and Economic Inclusion (*Ministerio de Inclusión Económica y Social*)
MINEDU	Ministry of Education (*Ministerio de Educación*)
RS	Social Registry (*Resgistro Social*)
SENPLADES	National Planning Secretary (*Secretaría Nacional de Planificación y Desarrollo*)
SRI	Internal Revenue Service (*Servicio de Rentas Internas*)
SICs	Social insurance contributions
UBS	Unified basic salary
URS	Social Registry Unit (*Unidad del Registro Social*)
US$	US dollar
VAT	Value-added tax (*Impuesto al valor agregado*)

1 Basic information

1.1 Basic information about the tax–benefit system

Since January 2000, Ecuador has officially adopted the US dollar (US$) as the country's legal tender (Larrea 2004).

The state old-age pension depends on three parameters: the cessation of work; the minimum age; and the number of contributions made to the Ecuadorian Institute of Social Security (*Instituto Ecuatoriano de Seguridad Social*, IESS). The minimum age for accessing the retirement pension is 60 years, with at least 360 monthly contributions having been made (meaning 30 years of contributions), and there is no age limit[1] to accessing the retirement pension if a worker has made 480 contributions or more (i.e. 40 or more years of contributions). The age limits to access retirement pension based on contribution history are defined by IESS (IESS 2015a).

The minimum legal working age in Ecuador is 15 years, but from 15 to 18 years of age children who work must combine their work with study, and their employers must ensure this condition is met. For tax and benefit purposes, dependent children are those aged below 18 years or those older, up to 23 years of age, if they are in full-time education, not receiving earnings, and not affiliated to the IESS. No age limits apply to children with disabilities.

There are three eligibility criteria for individuals accessing the Human Development Transfer (*Bono de Desarrollo Humano*, HDT): individuals aged 65 or more who do not have any other type of retirement pension in the Ecuadorian system; individuals with a disability, aged under 65 years and receiving no pension; and families with children who are below the official threshold of the Social Registry (*Resgistro Social*, RS) index, where the cash transfer is made to mothers and can only be paid to fathers in the absence of mothers (Martínez et al. 2017).

In Ecuador, the fiscal year runs from 1 January to 31 December.

There are national and local taxes in Ecuador. National taxes (e.g. personal income tax, value-added tax (*impuesto al valor agregado*, VAT)) do not differ across regions and are administered by the Internal Revenue Service (*Servicio de Rentas Internas*, SRI). Local taxes (e.g. property tax) are specific to each municipality and are administered by the local authorities. All national taxes are regulated by the Law of Internal Tax Regime (Ley de *Régimen Tributario Interno*, LRTI) (Asamblea Nacional 2014), whereas other regulations apply to local taxes. Social security benefits do not differ across regions and are administered by the IESS in the case of contributory benefits, or specific ministries in the case of non-contributory benefits.

Income is taxed individually in Ecuador (see Article 5 of the LRTI).[2]

Different income sources are aggregated for personal income tax calculations independently of their origin (e.g. capital or labour income).

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[1] Note that as the legal age to work and become affiliated to the IESS is 15 years, in principle, the minimum age for retirement is 55 years.

[2] Under certain conditions, it is possible to make a joint tax declaration. This is the case if the only source of income for a couple comes from single and joint business activity (Articles 70 and 71 of the regulation for enforcement of the LRTI). In practice, this applies to a very limited number of cases.

Withholdings are made for tax payments. According to the LRTI, if withholdings exceed tax liabilities, individuals can request reimbursement (in the case of personal income tax) or a credit (in the case of VAT).[3] If withholdings are lower than tax liabilities, taxpayers need to fill in a tax form and pay the difference. Individuals with more than one source of income need to fill in a tax form, independent of whether the withholdings match the tax liabilities.

For income tax and pensions, indexation is considered to take account of inflation. The consumer price index (CPI) of 30 November of each year is used to apply indexation to the following tax year.

The information and data contained in the National Survey of Income and Expenditures of Urban and Rural Households (*Encuesta Nacional de Ingresos y Gastos de Hogares Urbanos y Rurales*, ENIGHUR) 2011–12 are freely accessible under the Organic Law on Transparency and Access to Public Information (Congreso Nacional 2004).

1.2   Social benefits

1.2.1   Contributory social protection

Benefit 1—Old-age pensions (Jubilación ordinaria por vejez): Entitlement to contributory old-age pensions is assessed with respect to the age of the individual and the number of contributions made. For example, there is no age limit if individuals have 40 years of contributions (480 monthly contributions), while at least 10 years of contributions are required for individuals aged 70 years or more. The pension amount is based on an average of the five best years of workers' earnings multiplied by a number of contribution coefficients. Ceilings and floors, which are calculated in terms of the unified basic salary (UBS), apply to the old-age pension amounts.

Benefit 2—Invalidity pension (Jubilación por invalidez): Individuals are eligible for invalidity pension if they are unable to work due to illness or physical and/or mental impairment (IESS 2015c). Invalidity is assessed by medical examination in the IESS health system. The conditions for eligibility for absolute and permanent invalidity pension require that: (i) individuals have paid a minimum of 60 contributions, of which at least six must have been paid immediately and consecutively before the invalidity occurred; and (ii) unemployed individuals have paid a minimum of 120 contributions and are not beneficiaries of another pension from the IESS. They are eligible if invalidity occurs within the 24 months following termination of their work. The amount of the invalidity pension is equal to 50 per cent of the usual pay received by a worker in a similar labour market activity. Ceilings and floors apply to the level of the invalidity pension paid, which is calculated in terms of the UBS and depends on the number of years of contributions.

Benefit 3—Survivor's pensions (Montepío): The survivor's pension is a social insurance payment to widows, widowers, orphans, and/or parents of the person to whom the benefit was attributed (IESS 2015d). The monthly amount of the survivor's pension is equal to 40 per cent of the pension received by the insured person (IESS 2006), or 60 per cent if there is only one family member and they are not affiliated or receiving a pension (IESS 2010). The pension amount for orphans and parents equals 20 per cent of the pension received by the insured person. Ceilings and floors apply to the amount of the survivors' pension.

Benefit 4—Occupational risk pension (Seguro de riesgos de trabajo): The occupational risk pension is a social payment to cover accidents or health problems related to work. As well as providing medical assistance for surgery, medicine, hospitalization, and rehabilitation (including provision and

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[3] **In certain cases (e.g. for the elderly or individuals with a disability), it is also possible to request reimbursement of VAT up to a limited amount according to the regulation of LRTI.**

maintenance of prosthetics and orthotic devices), direct economic provisions are provided to people affiliated with the IESS (2015b). Invalidity resulting from an accident or health problem related to work is classified under four categories, depending on the severity of the injury: (i) temporary invalidity, (ii) partial permanent invalidity, (iii) total permanent invalidity, and (iv) absolute permanent invalidity. The amount of pension depends on the severity of the injury.

Benefit 5—Severance pay insurance benefit (Seguro de cesantía): To be eligible for severance pay insurance benefit, a person must (i) have made at least 24 non-simultaneous contributions to the IESS, (ii) have been unemployed for at least 60 days, and (iii) present a certificate of redundancy to the IESS. The amount of the severance pay insurance benefit is equal to a lump sum payment of three times the average gross employment income over the last 12 months before unemployment (Asamblea Nacional 2015: Social Security Law, Article 277). Unemployed individuals who are in the process of applying for old-age pension or invalidity pension have the right to claim the total amount saved in their individual severance pay insurance fund. In the case of death, the total amount saved in this fund can be claimed by a relative according to the dispositions specified in the law (Asamblea Nacional 2015: Social Security Law, Article 285).

Benefit 6—Rural workers' social insurance pension (Seguro campesino): The rural workers' social insurance benefits are aimed at providing protection in the event of disability, old age, illness, or death of workers in rural areas, as well as fishermen. For the purposes of social insurance, a rural worker is a person whose residency is located in a rural area and who works as a farmer or fisherman, as a self-employed worker, or for the community, and has not become a permanent employer. Moreover, to be affiliated to the rural workers' social insurance regime the person should not benefit from compulsory social insurance (Asamblea Nacional 2015: Social Security Law, Article 9).

Benefit 7—Unemployment insurance benefit (Seguro de desempleo): Unemployment insurance was introduced in March 2016 as an insurance for unemployed individuals who are affiliated to the general social security regime of the IESS and who have not found a job after 60 days (or two months) of unemployment. Unemployment payments are withdrawn from the contributory unemployment insurance fund. The 12-month salary average is paid in five monthly payments, where the first payment is 70 per cent of the 12-month average and subsequent payments are reduced by 5 per cent every month (e.g. first month 70 per cent, second month 65 per cent … fifth month 50 per cent, etc.).

1.2.2 Non-contributory social protection

Benefit 8—Human Development Transfer (*Bono de Desarrollo Humano*, HDT): HDT is the basis of other non-contributory social protection programmes (for more details, see Annex A). It establishes a foundation for protecting families from risks, such as the risk of falling into poverty, and promoting the development of skills that improve social mobility. Eligibility criteria for the HDT are restricted to those households below the official threshold of the RS index, which is a composite index of socioeconomic classification of the RS.[4] The RS mechanism has been in operation since 2003[5] and is focused on poor

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[4] The RS index is a welfare index which is calculated using information about characteristics of the population, and which is stored in a database managed through an information system that, since August 2017, has worked in SENPLADES (Presidencia de la República, 2017). The RS database also includes a cadastre at a national level which guarantees the identification of families living in poverty. The RS database is used for the identification, selection, targeting, and prioritization of beneficiaries or users of social programmes or state subsidies by the institutions responsible for them who determine the thresholds in the index for which they will grant the benefit. All beneficiaries of social programmes or state subsidies must be registered in the RS database; if not, they should request registration to the database. Information for the third RS (RS3) was collected during 2018 and 2019 (SENPLADES 2018).

[5] Up to 2007, it was called the SELBEN (Registro de Selección de Beneficiarios de Programas Sociales) index, but changed to the RS in 2008. From 2008 until 10 December 2017, there were two measures or indexes (SENPLADES 2018): (i) the RS1 index from 2008 to 2013 with a coverage of 2,319,820 households, 2,705,087 censal sectors, and 9,427,016 individuals; and (ii) the RS2 index from 2013 to 2017 with a coverage of 2,103,332 households, 2,373,748 censal sectors, and 7,816,489 individuals.

and extremely poor households, the elderly, and individuals with disabilities. However, since 2014, it has focused on extremely poor households only, which means there has been a reduction of around 60 per cent of beneficiaries since then.[6] Until 2011, the benefit amount was US$35 per month and increased to US$50 per month in 2015. Families with children must meet two conditions to receive the HDT. First, children in the household aged 6–18 years must enrol in school and attend for at least 90 per cent of the school days in a month. Second, children in the household aged below 6 years must attend health centres at least twice per year for medical check-ups. The programme's conditions also extend to prenatal health checks, sexual and reproductive health consultations, eradication of child labour and begging, maintenance of the dwelling, and an annual update about changes in the socioeconomic situation of the household. Although the HDT programme establishes the co-responsibilities families have and and sanctions for non-compliance, the follow-up process to check that the conditions are being met is only partially implemented.

According to MIES (2018), up to 30,000 elderly people receive a fixed HDT amount of US$100. Since January 2018, a variable HDT component has been introduced for families. The variable component states that US$30 will be paid for the first child up to 5 years of age. For the second and third children of the same age, US$27 and US$24.30 are paid, respectively. An additional sum of US$10 is paid for the first child between 5 and 18 years of age, and US$9 and US$8.10 are paid for the second and third children, respectively, in the same age range. According to the current RS database, in 2018, 74,000 families in extreme poverty received the variable bonus. The maximum value of the HDT between the fixed and variable components is US$150 and is conditional upon the fulfilment of the responsibilities of the users (Presidencia de la República 2018).

Benefit 9—Joaquín Gallegos Lara Transfer (*Bono Joaquín Gallegos Lara*): This benefit aims to improve the living conditions of individuals with severe disabilities or illness who are unable to live independently and who live under critical economic conditions (Presidencia de la República 2010: Executive Decree 422). The benefit is paid to the individual who is responsible for the care of the individual with the disability or illness. In addition to the monetary transfer, medicines and training for the carer are provided, as well as funerary insurance in case of the death of the person with the disability.

Benefit 10—Housing grant (*Bono de la vivienda*): The aim of this grant is to provide financial assistance to families living in Ecuador to help them to finance their first property purchase, the construction of a property on their own land, or improvement of their current property. Eligible individuals must (i) be a permanent resident in Ecuador; (ii) be older than 18 years, or, if living alone with no dependants, be older than 50 years; (iii) not own another house in Ecuador, in the case of first-time buyers and individuals intending to build on their own land, or own only the property that they intend to renew; (iv) have household income below 2.9 times the UBS; and (v) intend to purchase or build a property with a maximum value of US$30,000. The amount of the grant is US$5,000 in rural areas and US$20,000 in urban areas.

Benefit 11—Family Protection Grant (*Bono de Protección Familiar*, FPG): This cash transfer of US$120 was created due to the COVID-19 pandemic crisis and introduced to protect the 400,000 poorest families from April to May 2020 (Presidencia de la República 2020a). The identification was based on the RS index, and people were selected under three conditions: (i) being affiliated to the rural workers or unpaid work social security regimes, (ii) earning less than US$400 per month (equivalent to the legal minimum wage), and (iii) having no members of the household who receive contributory or non-contributory benefits or pensions. This transfer was updated in a second stage in May and June 2020 (Presidencia de la República 2020b), with the same amount of payment but targeting another 500,000

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[6] **A total of 748,000 households which received the HDT were excluded between April 2013 and April 2015 (SENPLADES 2018).**

under other conditions: (i) stage one beneficiaries are excluded, (ii) the head of the household must earn less than US$501.60 per month (equivalent to the official cost of a survivor basket of food and services), and (iii) no member of the household should be receiving contributory or non-contributory benefits or pensions.

1.2.3   Not strictly benefits

Not strictly benefit 1—Free school meals (*Programa de alimentacion escolar*): The programme aims to provide free school meals to children aged 3–14 years in order to reduce the gap in access to universal education and to improve its quality and efficiency in public primary school institutions. In 2020, due to the COVID-19 health crisis, face-to-face classes were suspended in almost all education establishments, therefore the school breakfast programme was suspended as of March 12 (MINEDU 2020).

Not strictly benefit 2—Free pre-school and elementary school uniforms and textbooks (*Programa Hilando el Desarrollo y textos escolares gratuitos*): The aim of this programme is to reduce the barriers to education through the distribution of free uniforms and textbooks for children in public schools. Similarly to the free school meals programme, in 2020, due to the COVID-19 health crisis, face-to-face classes were suspended in almost all education establishments, therefore the free uniforms and textbooks programmes were also suspended as of March 12 (MINEDU 2020).

1.3   Social contributions

Social insurance contribution 1—to the general regime (*Aportaciones al IESS*): Social insurance contributions (SICs) finance pensions, and other contributory benefits (e.g. severance pay). Conditions relating to past contributions determine eligibility and the amount of contributory benefits paid. SICs are defined according to the sector of work of the individual affiliated with the IESS. They cover six types of insurance: pension insurance, health insurance, occupational risk insurance, rural worker insurance, severance pay insurance, and disability insurance (since 2014), as well as administration costs. SICs are assessed on gross incomes above the UBS.

Social insurance contribution 2—for the armed forces and police (*Aportaciones al ISSFA o ISSPOL*): Members of the armed forces and the national police are affiliated to special social security regimes with the Institute of Social Security of the Armed Forces *(Instituto de Seguridad Social de las Fuerzas Armadas*, ISSFA) and the Institute of Social Security of the National Police (*Instituto de Seguridad Social de la Policia Nacional*, ISSPOL), respectively. Contributions to these programmes finance contributory benefits such as pension insurance and health.

1.4   Taxes

1.4.1   National taxes

Tax 1—Personal income tax (*Impuesto a la renta de personas naturales*): Personal income tax is assessed at the individual level in Ecuador. Taxable income is composed of earnings from labour, extra pay, income from capital, and income from rent. There are exemptions for the 13th and 14th months, reserve funds, and deductions for disability and old age. Deductions to taxable income are composed of SICs and deductions for the following five categories of personal and dependant expenditures: housing, education, food, clothing, and health.[7] The tax base is defined as taxable income minus exemptions, minus deductions. The tax schedule has eight bands and rates between 5 and 35 per cent.

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[7] **The maximum deductible amount for expenses in 2019 is US$14,703, which can be distributed in the categories of housing, education, food, and clothing up to US$3,675.75 each and in health up to the maximum US$14,703 by itself; however, another restriction is that the total deductible value must not exceed 50 per cent of the taxable income.**

Since January 2020, personal expenditures may be deducted only for individuals with a income below US$100,000 (SRI 2020).

Tax 2—Corporate profit tax (*Impuesto a la renta de personas jurídicas*): Until 2011, income from companies was taxed at a flat rate of 25 per cent. After 2011, the tax rate progressively decreased by 1 percentage point per year until it reached 22 per cent, when it was fixed. From 2014, under Article 37 of the LRTI, income from companies established in Ecuador, as well as branches of foreign companies settled in the country and permanent establishments of foreign companies without fiscal residence in Ecuador, have been taxed at the rate of 22 per cent.[8] A higher tax rate of 25 per cent applies where companies have shareholders, partners, founders, or beneficiaries who are residents, or are established in tax havens or regimes with a lower imposition, and who have a direct or indirect share equal to or higher than 50 per cent of the company's capital. When the share is lower than 50 per cent, the rate of 25 per cent is applied to the proportion of the tax base equivalent to that share. A 25 per cent tax rate also applies if the company fails to advise of changes to company shares by its shareholders, partners, founders, or beneficiaries.

Tax 3—Motor vehicle tax (*Impuesto a los vehículos motorizados*): Under the Law of Tax Reform published in Supplement R.O. 325 of 14 May 2001, each owner of a motor vehicle is liable to an annual tax on the vehicle owned. The tax base corresponds to a valuation of the vehicle by the SRI. For new motor vehicles, the valuation is equal to the highest public selling price provided by the sellers. For other vehicles, the valuation corresponds to the highest selling price minus 20 per cent of annual depreciation, but the residual value cannot be lower than 10 per cent of the initial price.

Tax 4—Environment tax for car pollution (*Impuesto ambiental a la contaminación vehicular*): In 2012, an environment tax for motor vehicle pollution was introduced by the Decree of Law published in Supplement R.O. 583 of 24 November 2011. The tax amount depends on the type of vehicle (regular or hybrid) and the cylinder capacity. Exempted from the tax are vehicles of public institutions and professional drivers, vehicles for transporting people with disabilities, classic cars, electric vehicles, ambulances, vehicles of international organizations or diplomatic service, vehicles linked to the economic activity of the owner, and vehicles of senior citizens. This tax was abolished by resolution in July 2019, which will take effect in 2020 (Asamblea Nacional, 2019).

Tax 5—Tax on non-returnable plastic bottles (*Impuesto redimible a las Botellas Plásticas no Retornables*): This tax comes under the special *Ley de Fomento Ambiental y Optimización de los Ingresos del Estado* (2011) regime and is levied on the bottling of alcoholic, non-alcoholic, soda, and non-carbonated beverages and water in non-returnable plastic bottles (i.e. polyethylene terephthalate, PET, material). The tax is also levied on imported beverages at the time of customs clearance. It is not levied on the bottling of dairy products or medicines in non-returnable plastic bottles.

Tax 6—Tax on international money transfers (*Impuesto a la salida de divisas*): In 2008, a tax on international money transfers (*Impuesto a la Salida de Divisas*, ISD) from Ecuador was introduced by the Law for Tax Equity of 29 December 2007 (Article 155) with the aim to control the flow of capital leaving the country (CEF 2013).[9] Initially, the tax rate was set at 0.5 per cent; it increased to 2 per cent in 2010 and then to 5 per cent in 2012. In 2008, the ISD raised a total revenue of around US$31 million, rising to more than US$1,200 million in 2014 (SRI 2015a).

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[8] A company has fiscal residence in Ecuador if it was created or established in Ecuadorean territory.

[9] There are currently internal discussions within the tax authority about whether to consider this instrument as a direct or indirect tax.

Tax 7—VAT: VAT is regulated by the LRTI and applies to national operations as well as imported ones. Since 2000, the VAT rate has been set at 12 per cent.[10] However, some goods and services considered to be basic necessities, such as food products and basic services like water and electricity, are taxed at a 0 per cent rate. The full list of goods taxed at 0 per cent is specified in Articles 54 and 55 of the LRTI. In 2016, the VAT rate increased to 14 per cent in all provinces except Manabí and Esmeraldas, which were hit by the earthquake of April 2016. By June 2017, the VAT returned to 12 per cent in all provinces.

Tax 8—Excise duties (*Impuesto a los Consumos Especiales*, ICE): Excise duties are levied on luxury goods, such as alcohol, tobacco products, and automobiles, and apply to national operations as well as imported ones. The types of goods on which excise duties are levied, as well as the specific tax rates for each good, have been subject to change since the introduction of the LRTI in 1989. Article 82 of the LRTI specifies the list of goods on which the special consumption tax (or ICE) was levied in 2014. The rates vary widely with respect to the type of good, from 5 per cent for motor vehicles (that can carry up to 3.5 tonnes of cargo and with a sale price less than or equal to US$20,000) to 300 per cent for guns and ammunitions. The Special Consumption Tax (ICE) on plastic bags came into force on 9 May 2020 (SRI 2020b).

Tax 9—Simplified tax regime *(Régimen Impositivo Simplificado)*: This is regulated by the LRTI and is a voluntary registration regime for personal taxes only (does not apply to companies), which replaces the payment of VAT and income tax through monthly instalments and aims to improve the tax culture in the country. Article 97.1 and the LRTI specify the following conditions for individuals to access the scheme: (i) individuals should not have income greater than US$60,000 per year, or, if it is under a dependency ratio, the income for this concept does not exceed the basic fraction of the income tax charged at a 0 per cent rate for each year; (ii) individuals should not be engaging in any of the restricted activities; and (iii) individuals should not have withheld taxes for the last three years.

1.4.2 Sub-national taxes

Tax 10—Property tax (*Impuesto predial*): This tax is administered by the municipalities and is therefore not regulated by the LRTI. In Ecuador, there are 221 cantons, each with its own municipality, so there may be the same number of methodologies for the payment of this tax. However, some general rules are as follows: residential property taxes are based on a percentage of the municipal value of the property; urban and rural properties are taxed at different rates; and homeowners aged 65 years and older are subject to exemptions or reduced rates of property tax.

Tax 11—Registration and patents tax (*Impuesto de matrículas y patentes*): This tax is administered by the municipalities and is therefore not regulated by the LRTI. To carry out an economic activity of a commercial or industrial nature, an annual patent must be obtained and paid for, with prior registration in the registry maintained by each municipality.

Tax 12—Tax on public events (*Impuesto a los espectáculos públicos*): This tax is also administered by the municipalities and is therefore not regulated by the LRTI. It corresponds to a single tax of 10 per cent on the legally allowed value of the price of the tickets sold for the public event, except for professional sports events, which pay 5 per cent of this value.

Tax 13—Tax of US$1.5 per thousand dollars of total assets (*Impuesto 1.5 X mil sobre activos totales*): This tax is applied to companies and individuals who are obliged to keep accounts. Taxpayers who carry out activities in more than one canton present their tax declaration in the canton where they have their principal domicile. They need to specify the percentage of income obtained in each of the

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[10] **The VAT rate changed from 10 per cent to 12 per cent on 1 January 2000 (reform to the LRTI published in the Supplement R.O. 321 of 18 November 1999).**

cantons where they have branches, and the value of the tax that corresponds to each municipality is determined based on said percentages.

Tax 14—Taxes on the transfer of ownership of real estate (*Impuestos a la transferencia de dominio de bienes inmuebles*): According to the local regulations, when transferring ownership of a property, capital gains tax must be paid to the municipal authorities (Alcaldia del MD de Quito 2017).

2   Simulation of taxes and benefits in ECUAMOD

2.1   Scope of simulation

Tables 2.1 and 2.2 present, respectively, the tax and benefit components included in the model. The tables differentiate between those components that are included in the model but not simulated and those that are simulated in ECUAMOD, and explain why simulation was not feasible.

Table 2.1: Simulation of taxes and social contributions in ECUAMOD

	Variable name(s)	Treatment in ECUAMOD (2011–20)	Why not fully simulated?
Personal income tax	*tin_s*	S	
Property tax	*tpr*	I	No information on property values in the data
Motor vehicle tax	*tca*	I	No information on vehicle values in the data
Value-added tax (VAT)	*tva_s*	S	
Special consumption tax (ICE) (excise duties)	*tex_s*	S	
Employee social insurance contributions (SICs)	*tscee_s*	S	
Armed forces and police SICs	*txcee_s*	S	
Self-employed SICs	*tscse_s*	S	
Employer SICs	*tscer_s*	S	
Government SICs for armed forces and police	*txcer_s*	S	

Notes: 'S' policy is simulated although some minor or very specific rules may not be simulated; 'I' policy is included in the microdata but not simulated.

Source: Authors' compilation.

Table 2.2: Simulation of benefits in ECUAMOD

	Variable name(s)	Treatment in ECUAMOD (2011–20)	Why not fully simulated?
Old-age pension	*poa*	I	No data on contribution records
Invalidity pension	*pdi*	I	No data on contribution records
Survivors' pension	*psu*	I	No data on contribution records
Human Development Transfer (HDT)	*bsa*	S	
Joaquín Gallegos Lara	*bdi*	PS	No data on severity of disability in the data
Housing grant	*bho*	I	No information about the price of the property individuals intend to buy nor about the cost of planned remodelling for their current house
Unemployment insurance benefit		E	No data on unemployment benefit in ENIGHUR 2011–12 or ENEMDU; no data on contribution records or previous earnings to simulate entitlement to unemployment insurance
Family Protection Grant (FPG)	*bot*	S	

Notes: 'I' policy is included in the microdata but not simulated; 'S' policy is simulated although some minor or very specific rules may not be simulated; 'PS' policy is partially simulated as some of its relevant rules are not simulated; 'E' policy is excluded in the model as it is neither included in the microdata nor simulated. ENIGHUR, Encuesta Nacional de Ingresos y Gastos de Hogares Urbanos y Rurales (National Survey of Income and Expenditures of Urban and Rural Households).

Source: Authors' compilation.

There were no structural changes in the tax–benefit system in Ecuador between 2011 and 2013. Parameter changes during these years are explained in detail in the following sections for the tax–benefit instruments simulated in the model. In 2014, the only change related to the introduction of a disability insurance contribution for employees at a rate of 0.1 per cent and the introduction of a severance pay insurance contribution for the self-employed at a rate of 3 per cent.

2.1.1 Structural changes

In March 2016, the unemployment insurance benefit was introduced. In order to be eligible for unemployment insurance, individuals must have contributed to the social security system for a period of 24 months. The benefit amount is based on the average earnings of the last 12 months in work and decreases over time. The maximum duration is five months.

In 2016, the VAT rate increased to 14 per cent in all provinces except Manabí and Esmeraldas, which were hit by the earthquake of April 2016. On 1 June 2017, the VAT rate returned to its previous rate of 12 per cent in all provinces.

In January 2018, the amount of HDT for the elderly increased to US$100 but the threshold of the RS index decreased to the same level of that for families with children.

From January 2018, a variable HDT benefit amount was introduced in addition to the fixed amount (US$50) for families with children. The variable component depends on the number of children of different ages in the family. For the first child under 5 years of age, an additional amount of US$30 is paid. For the second and third children of the same age, the variable amount is US$27 and US$24.30, respectively. For the first child aged between 5 and 18 years, there is an additional payment of US$10, and US$9 and US$8.10 are paid, respectively, for the second and third children between 5 and 18 years of age. However, the total amount of HDT (fixed plus variable amounts) cannot exceed US$150 per month and is conditional upon the fulfilment of the responsibilities of the recipients (Presidencia de la República, 2018).

From April to June 2020, the Family Protection Grant was implemented. This cash transfer of US$120 was created due to the COVID-19 crisis and was instrumentalized in two stages. In the first stage, from April to May, it targeted the 400,000 poorest families (Presidencia de la República 2020a). This transfer was updated in a second phase from May to June 2020, to reach 500,000 other poor families (Presidencia de la República 2020b). In the second stage, families received the same amount of payment. In both stages, individuals in receipt of contributory and non-contributory benefits or pensions were not eligible for the transfer.

2.2 Order of simulation and interdependencies

Table 2.3 shows the order in which the policies in ECUAMOD are simulated. The order is the same for all years.

Table 2.3: ECUAMOD spine: order of simulation

Policy	EC_2011	EC_2012	EC_2013	EC_2014	EC_2015	EC_2016	EC_2017	EC_2018	EC_2019	EC_2020	Description of the instrument and main output
SetDefault_ec	On	On	On	On	On	On	On	On	On	On	DEF: Default values for variables in the simulation
Uprate_ec	On	On	On	On	On	On	On	On	On	On	DEF: Uprating factors
ConstDef_ec	On	On	On	On	On	On	On	On	On	On	DEF: Constants
Ilsdef_std_ec	On	On	On	On	On	On	On	On	On	On	DEF: Standard income concepts
Ildef_non_std_ec	On	On	On	On	On	On	On	On	On	On	DEF: Non-standard income concepts
Ildef_stats_ec	On	On	On	On	On	On	On	On	On	On	DEF: Income lists for the Statistics Presenter
Ildef_exp_ec	On	On	On	On	On	On	On	On	On	On	DEF: Expenditure income lists (COICOP)
TUDef_ec	On	On	On	On	On	On	On	On	On	On	DEF: Assessment units
yem_ec	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	DEF: Minimum wage
neg_ec	On	On	On	On	On	On	On	On	On	On	DEF: Recode negative self-employment income to zero
ses_ec	On	On	On	On	On	On	On	On	On	On	DEF: Choice of equivalence scale
spl_ec	On	On	On	On	On	On	On	On	On	On	DEF: Ecuadorian Poverty Lines
tscee_ec	On	On	On	On	On	On	On	On	On	On	SIC: Employee Social Insurance Contributions (*Aportaciones personales IESS asalariados*)
txcee_ec	On	On	On	On	On	On	On	On	On	On	SIC: Armed Forces and Police Social Insurance Contributions (*Aportaciones personales ISSFA o ISSPOL*)
tscse_ec	On	On	On	On	On	On	On	On	On	On	SIC: Self-employed Social Insurance Contributions
tscer_ec	On	On	On	On	On	On	On	On	On	On	SIC: Employer Social Insurance Contributions (*Aportaciones patronales IESS*)
txcer_ec	On	On	On	On	On	On	On	On	On	On	SIC: Government Social Insurance Contributions for armed forces and police (*Aportaciones patronales ISSFA/ISSPOL*)
tin_ec	On	On	On	On	On	On	On	On	On	On	TAX: Personal Income Tax (*Impuesto a la renta de personas naturales*)
bsa_ec	On	On	On	On	On	On	On	On	On	On	BEN: Human Development Transfer (*Bono de Desarrollo Humano*)
bcrdi_ec	On	On	On	On	On	On	On	On	On	On	BEN: Disability Carer Benefit (*Bono Joaquín Gallegos Lara*)
bot_ec	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	On	BEN. Family Protection Grant (*Bono de Protección Familiar; COVID*)
tva_ec	On	On	On	On	On	On	On	On	On	On	TAX: Value-added tax (*IVA*)
tex_ec	On	On	On	On	On	On	On	On	On	On	TAX: Special Consumption Tax—excise and ad valorem (*Impuesto a los Consumos Speciales*)
output_std_ec	On	On	On	On	On	On	On	On	On	On	DEF: Standard output individual level
output_std_hh_ec	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	DEF: Standard output household level

Notes: DEF, definitional policy; SIC, social insurance contribution policy; BEN, benefit policy.

Source: Authors' compilation.

The minimum wage is simulated first, as the simulation of this policy affects employment income, which is subsequently an input to SICs, personal income tax, and means-tested benefits. The national minimum wage is also known as UBS (defined earlier) and is the basis for the calculation of the floor and ceiling levels of contributory pensions and benefits. The UBS was fixed at US$264 in 2011, US$292 in 2012, US$318 in 2013, US$340 in 2014, US$354 in 2015, US$366 in 2016, US$375 in 2017, US$386 in 2018, US$394 in 2019, and US$400 in 2020.[11] Note, however, that the minimum wage is turned off in all years.

SICs are simulated first as they are deducted from taxable income in the simulation of personal income tax. HDT and the disability carer benefit are not taxable and are therefore simulated after income tax. VAT is simulated at the end.

2.3   Social benefits

2.3.1 Human Development Transfer (HDT) (bsa_s)

Definitions

The objective of HDT is to improve human capital and avoid the persistence of poverty through direct monetary transfers to poor families. It aims to (i) guarantee a minimum level of income to families, (ii) introduce co-responsibilities for investment in health and education, and (iii) protect the elderly and individuals with disabilities.

Eligibility conditions

Three population sub-groups are eligible for HDT:

- Families with children younger than 18 years;
- Elderly adults who do not receive any pension; and
- Individuals with a disability.

Income test

HDT is a proxy means-test benefit. The proxy means test is based on the composite index of socioeconomic classification of the RS. The index is based on a series of variables containing information on household characteristics, characteristics of the head of the household, housing, living conditions, assets, and territory (Fabara, 2009).

In order to be eligible for HDT, families (a couple or single adult with children aged 0–18 years, where children aged 5–18 years must be enrolled in and attending education) with children aged 18 years or below need to belong to the poorest population according to the composite index; that is, they need to fall below the poverty line established by the Ministry of Social Development Coordination (*Ministerio de Coordinación de Desarrollo Social*). Elderly adults and individuals with a disability (with a 40 per cent or higher degree of disability) need to be in vulnerable conditions (as defined by the Ministry of Social Development Coordination) and cannot be affiliated with any type of social security institution.

Conditionality

Two types of conditionality apply to mothers with children receiving HDT. First, children in the household aged 6–18 years must be enrolled in school and attend at least 90 per cent of the school

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[11] During the COVID-19 crisis, the Humanitarian Law (Ley Humanitaria) made the dismissal of workers more flexible; it also offered employers the possibility of decreasing wages and/or hours of work during the sanitary emergency (Asamblea Nacional 2020).

days in a month. Second, children in the household aged below 6 years must attend health centres at least twice per year for medical check-ups. There are also conditions relating to prenatal health checks, sexual and reproductive health consultations, eradication of child labour and begging, maintenance of the dwelling, and an annual update relating to any changes in the socioeconomic situation of the household.

Benefit amount

In 2011, the benefit amount for HDT was US$35 per month. This increased to US$50 per month in 2013 (Presidencia de la República, 2009, 2013). From January 2018, the HDT amount increased to US$100 for elderly adults, and the amount for families consists of a basic component of US$50 and a variable component that depends on the age and number of children in the family. For the first child below 5 years of age, an additional amount of US$30 is paid. For the second and third children of the same age, the variable amount is US$27 and US$24.30, respectively. For the first child aged between 5 and 18 years, there is an additional payment of US$10; for the second and third children between 5 and 18 years of age, US$9 and US$8.10 are paid, respectively. However, the total amount of HDT (fixed plus variable amounts) cannot exceed US$150 per month and is conditional upon the fulfilment of the responsibilities of the recipients (Presidencia de la República, 2018).

ECUAMOD notes

In order to simulate eligibility for HDT, a pseudo composite index was generated in the input data. Our pseudo index and the official index are likely to have different distributions as they are based on different samples and variables. Therefore, we determine the threshold for eligibility as the value of the pseudo index below which we identify the same number of individuals as the official index. In 2014, the official threshold was revised for families with children. The new threshold for our pseudo index is determined in the same way, that is, the value below which we identify the same number of individuals, as with the official threshold.

2.3.2 Joaquín Gallegos Lara Transfer (bcrdi_s)

Definitions

In 2010, the Joaquín Gallegos Lara transfer was introduced with the aim of improving the living conditions of individuals with a severe disability or illness who are unable to live independently and who live under critical economic conditions (Presidencia de la República 2010: Executive Decree 422).

Eligibility conditions

The following individuals are eligible for the benefit:

- Individuals with severe disability (with a minimum level of physical disability of 75 per cent or a minimum level of mental disability of 65 per cent);
- Individuals with catastrophic or rare illnesses who are not affiliated with or receiving pensions from the IESS, ISSFA, or ISSPOL;
- Children below the age of 14 years living with HIV/AIDS; and
- Orphans.

Income test

There is no income test, but medical/institutional certification is required.

Benefit amount

The benefit amount is US$240 per month, paid to the person who is responsible for the care of the individual with the disability or illness. Medicines and training for the carer are also provided, as well as

funerary insurance in case of death of the person with a disability. The carer can also have access to life insurance of US$500.

ECUAMOD notes

The Joaquín Gallegos Lara transfer is only 'part simulated' in ECUAMOD, meaning that eligibility for the benefit is based on whether individuals are observed as receiving the benefit in the data. Full simulation (simulation of eligibility) is not possible because information about the degree of disability is not available in the data.

2.3.3 Family Protection Grant (bot_s)

Definitions

In March 2020, the Family Protection Grant (*Bono de Protección Familiar*) was introduced to protect poor families against the economic shock resulting from the COVID-10 pandemic. The transfer targeted two population groups and a total number of 900,000 households under a two-stage process. A cash transfer of US$120 was paid in two monthly instalments (i.e. US$60 each month) to households fulfilling the eligibility conditions (Presidencia de la República 2020a, 2020b).

Eligibility conditions

In the first stage, 400,000 low-income households were targeted. The following individuals were eligible for the benefit (Presidencia de la República 2020a):

- Individuals affiliated to the rural workers or unpaid work social security regimes;
- Individuals earning less than US$400 per month (equivalent to the legal minimum wage);
- Individuals belonging to households where no members of the household receive contributory or non-contributory benefits or pensions.

In the second stage, 500,000 low-income households were targeted, excluding stage one beneficiaries. To be eligible, the following criteria needed to be fulfilled (Presidencia de la República 2020b):

- The head of the household must earn less than US$501.60 per month (equivalent to the official cost of a survivor basket of food and services);
- No member of the household should be receiving contributory or non-contributory benefits or pensions.

Income test

The first stage targeted households with individuals earning less than US$400 per month. The second stage targeted households where the head of the household earns less than US$501.60 per month.

Benefit amount

The benefit amount was US$120, which was paid in two monthly instalments (i.e. US$60 each month). Households targeted in the first stage of the process were paid the two monthly instalments in April and May 2020. Households targeted in the second stage of the process were paid the two monthly instalments in May and June 2020.

ECUAMOD notes

Although the policy rules of the Family Protection Grant define eligibility criteria based on income, the Social Registry was used in practice in the implementation. This was due to the difficulties of assessing income, for example because of informality (URS 2020). For consistency with the practical implementation of the transfer, we use the pseudo index of the Social Registry to simulate eligibility. In

the simulations, we fix the eligibility threshold such that the simulated transfer covers 900,000 households, which was the total target.

The policy systems provided in ECUAMOD v2.0 reflect policies as they were in place as of June 1 of that specific year. Each system thus provides a 'snapshot' of the situation of the tax-benefit system at the cut-off date. The Family Protection Grant was in force on the cut-off date. However, the payment consisted of two monthly instalments, meaning that the duration of the benefit payment lasted only two months. In order to take into account the duration of the benefit, the Family Protection Grant has been implemented using the Full Year Adjustment (FYA) switch in EUROMOD. This means that the total benefit amount over the year is divided by 12 months (i.e. US$120/12). The switch is set to 'on' in the baseline, as the Family Protection Grant was in force on the cut-off date.

2.4 Social contributions

SICs in Ecuador are defined according to the sector of work of the individual affiliated with the IESS. The number of categories related to specific sectors of employment has changed over time. The following categories have been defined since 2011:

- Category A: private sector employees and secular clergy members;
- Category B: bank employees, employees of municipal and decentralized public institutions, notaries, and property and commercial registrars;
- Category C: civil servants, including public education teachers and employees in the judiciary system, or other organizations providing public services;
- Category D: foreign service officers living abroad;
- Category E: temporary workers in the sugar industry;
- Category F: self-employed workers; and
- Category G: voluntary affiliates to the IESS.

The following sub-sections describe SICs for employees, employers, and the self-employed according to the definition of the different categories presented above for the 2011–20 period. We are able to distinguish between five of the categories in particular for the simulations in ECUAMOD: A, B, C, F, and G. The other categories cannot be distinguished in the data and represent only a small proportion of the workforce, so it is assumed that for these other categories social contributions are paid in line with the rules for the main category (A).

2.4.1 Employee social contributions (tscee_s)

Liability for contributions

All employees are liable to pay SICs based on their labour income.

Income base used to calculate contributions

The contribution base is defined as gross employment income. The minimum contribution base equals the value of the UBS, except for part-time employees for whom the minimum contribution base is calculated based on a proportion of the minimum wage according to the number of days they work.

Contribution rates

In 2011, employees were liable for four types of social contributions: pension insurance, rural worker insurance, severance pay insurance, and administrative costs. From 2014, an additional SIC for disability was implemented (IESS 2014a). In 2016, contributions to health insurance were introduced but they were abolished in 2017 except for category C, for which they have been retained.

The contribution rates for workers in category A for the years 2011–20 are as shown in Table 2.4.

Table 2.4: Employee SIC rates for category A (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pension insurance	6.64	6.64	6.64	6.64	6.64	5.76	6.64	6.64	6.64	6.64
Rural worker social insurance	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Severance pay insurance	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Disability insurance	—	—	—	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Health insurance	—	—	—	—	—	0.88	—	—	—	—
Administration costs	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Total	9.35	9.35	9.35	9.45	9.45	9.45	9.45	9.45	9.45	9.45

Source: Authors' compilation based on IESS (2011a, 2011b, 2014a, 2014b, 2015f, 2016).

The contribution rates for workers in category B for the years 2011–20 are as shown in Table 2.5.

Table 2.5: Employee SIC rates for category B (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pension insurance	8.64	8.64	8.64	8.64	8.64	7.76	8.64	8.64	8.64	8.64
Rural worker social insurance	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Severance pay insurance	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Disability insurance	—	—	—	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Health insurance	—	—	—	—	—	0.88	—	—	—	—
Administration costs	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Total	11.35	11.35	11.35	11.45	11.45	11.45	11.45	11.45	11.45	11.45

Source: Authors' compilation based on IESS (2011a, 2011b, 2014a, 2014b, 2015f, 2016).

The contribution rates for workers in category C for the years 2011–20 are as shown in Table 2.6.

Table 2.6: Employee SIC rates for category C (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pension insurance	8.64	8.64	8.64	8.64	8.64	5.76	6.64	6.64	6.64	6.64
Rural worker social insurance	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Severance pay insurance	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Disability insurance	—	—	—	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Health insurance	—	—	—	—	—	2.88	2.00	2.00	2.00	2.00
Administration costs	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Total	11.35	11.35	11.35	11.45	11.45	11.45	11.45	11.45	11.45	11.45

Source: Authors' compilation based on IESS (2011a, 2011b, 2014a, 2014b, 2015f, 2016).

Finally, since 2009, pensioners also contribute to social insurance at a rate of 2.76 per cent of their pension income.

ECUAMOD notes

Employee SICs for worker categories A–C are simulated in ECUAMOD according to the information available in the data. The categories that cannot be distinguished in the data represent only a small proportion of the workforce, who are assumed to pay social contributions in line with the rules for the main category (A).

2.4.2 Employer social contributions (tscer_c)

Liability for contributions

All employers are liable to pay SICs on gross employment income.

Income base used to calculate contributions

The contribution base is defined as gross employment income. The minimum contribution base equals the value of the UBS, except for part-time employees for whom the minimum contribution base is calculated based on a proportion of the minimum wage according to the number of days they work.

Contribution rates

Employers are liable for six types of SICs: pension insurance, health insurance, occupational risk insurance, rural worker insurance, severance pay insurance, and administrative costs.

For workers in categories A and B, the contribution rates in Table 2.7 apply.

Table 2.7: Employer SIC rates for categories A and B (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pension insurance	3.10	3.10	3.10	3.10	3.10	0.10	0.16	0.16	0.16	0.16
Health insurance	5.71	5.71	5.71	5.71	5.71	9.06	9.00	9.00	9.00	9.00
Occupational risk insurance	0.55	0.55	0.55	0.55	0.55	0.20	0.20	0.20	0.20	0.20
Rural worker insurance	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Severance pay insurance	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Administration costs	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Total	11.15	11.15	11.15	11.15	11.15	11.15	11.15	11.15	11.15	11.15

Source: Authors' compilation based on IESS (2011a, 2011b, 2014a, 2014b, 2015f, 2016).

For category C, the contribution rates in Table 2.8 apply.

Table 2.8: Employer SIC rates for category C (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pension insurance	1.10	1.10	1.10	1.10	1.10	0.10	0.16	0.16	0.16	0.16
Health insurance	5.71	5.71	5.71	5.71	5.71	7.06	7.00	7.00	7.00	7.00
Occupational risk insurance	0.55	0.55	0.55	0.55	0.55	0.20	0.20	0.20	0.20	0.20
Rural worker insurance	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Severance pay insurance	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Administration costs	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Total	9.15	9.15	9.15	9.15	9.15	9.15	9.15	9.15	9.15	9.15

Source: Authors' compilation based on IESS (2011a, 2011b, 2014a, 2014b, 2015f, 2016).

ECUAMOD notes

Employer SICs of the three worker categories A–C are simulated in ECUAMOD according to the information available in the data. The categories that cannot be distinguished in the data represent only a small proportion of the workforce and are assumed to pay social contributions in line with the rules for the main category (A).

2.4.3 Self-employed social contributions (tscse_s)

Liability for contributions

Self-employed workers can contribute to SICs on a voluntary basis.

Income base used to calculate contributions

Self-employed workers contribute to social insurance based on their declared gross self-employment income with specific rates. The minimum contribution base equals the value of the UBS.[12]

Contribution rates

In 2009, a single category was defined, regrouping all self-employed groups and individuals voluntarily affiliated to the IESS (IESS 2009). In 2011, the category was split into two separate categories: self-employed workers (category F) and voluntary affiliated workers (category G) (IESS 2011a, 2011b, 2016b). The contribution rates for these categories are presented in Tables 2.9 and 2.10.

Table 2.9: Self-employed SIC rates for category F (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pension insurance	9.74	9.74	9.74	9.74	9.74	5.86	6.80	6.80	6.80	6.80
Health insurance	5.71	6.06	6.06	5.71	5.71	9.94	9.00	9.00	9.00	9.00
Occupational risk insurance	0.55	0.55	0.55	0.55	0.55	0.20	0.20	0.20	0.20	0.20
Severance pay insurance	—	—	—	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Rural worker insurance	0.70	0.35	0.35	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Disability insurance	—	—	—	—	—	0.10	0.10	0.10	0.10	0.10
Administration costs	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Total	17.50	17.50	17.50	20.50	20.50	20.50	20.60	20.60	20.60	20.60

Source: Authors' compilation based on IESS (2011a, 2011b, 2014a, 2014b, 2015f, 2016).

Table 2.10: Voluntary affiliates SIC rates for category G (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pension insurance	9.74	9.74	9.74	9.74	9.74	5.86	6.80	6.80	6.80	6.80
Health insurance	5.71	6.61	6.61	5.71	5.71	9.94	9.00	9.00	9.00	9.00
Occupational risk insurance	0.55	—	—	0.55	0.55	0.20	0.20	0.20	0.20	0.20
Severance pay insurance	—	—	—	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Rural worker insurance	0.70	0.35	0.35	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Disability insurance	—	—	—	—	—	0.10	0.10	0.10	0.10	0.10
Administration costs	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Total	17.50	17.50	17.50	20.50	20.50	20.50	20.60	20.60	20.60	20.60

Source: Authors' compilation based on IESS (2011a, 2011b, 2014a, 2014b, 2015f, 2016).

An additional category of workers included in the simulation of self-employed SICs is rural workers who are affiliated to the special rural worker social security regime (*Seguro Campesino*). In order to be a member of the rural worker social security regime, an individual must (i) have residency in the rural area or be an artisanal fisherman, (ii) not be affiliated to the general social security regime, (iii) not receive wages from an employer, and (iv) not be a permanent employer. The amount of SICs paid by members of the rural worker social security regime is equal to 2.5 per cent of 22.5 per cent of the UBS.

ECUAMOD notes

Self-employed SICs of the two worker categories F and G are simulated in ECUAMOD according to the information available in the data.

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[12] **For housewives, the contribution is fixed at US$2 per month. ECUAMOD does not simulate these cases, which represent only 0.37 per cent of the sample.**

Since 2015, there has been another social insurance contribution regime for the unpaid house-workers category (*Trabajadores no remunerados del hogar*), which is mainly for housewives.[13] We are unable to simulate contributions to this regime because affiliation information is not available as the survey contains information for 2011 and 2012.

2.4.4 Armed forces and police social contributions (txcee_s and txcer_s)

Members of the armed forces or the national police contribute to special social insurance regimes. Members of the armed forces are affiliated to the ISSFA, whereas members of the national police are affiliated to the ISSPOL.

The information available in the input data for ECUAMOD enables us to distinguish those individuals who are affiliated to the IESS from those who are affiliated to the ISSFA or ISSPOL (but not to each of them). For this reason, in addition to SICs to the IESS, ECUAMOD simulates contributions made by members of the armed forces or the national police, as well as government contributions to these regimes (employer contributions).

The rate of SICs for members of the ISSFA is 23 per cent, whereas the rate for members of the ISSPOL is 23.10 per cent. For both regimes, the government contribution is 26 per cent of earnings.

ECUAMOD notes

The level of detail in the input data for ECUAMOD does not enable us to distinguish whether an individual is affiliated to the ISSFA or the ISSPOL. For this reason, we simulate SICs jointly to these regimes, with a contribution rate fixed at 23.05 per cent of earnings.

2.5 Personal income tax (tin_s)

Personal income tax is regulated by the LRTI. Major reforms to this tax were introduced by the Law of Tax Equity (*Ley Reformatoria para la Equidad Tributaria*) of 2007 (Asamblea Constituyente 2007), which entered into force in 2008 and aimed to increase the progressivity of personal income tax and to improve tax collection.

2.5.1 Tax unit

Personal income tax in Ecuador is assessed at the individual level.

2.5.2 Taxable income

Since 2008, taxable income has been composed of earnings from labour (employment and self-employment income) plus contributions to social security, plus extra pay, plus profit sharing (Asamblea Constituyente 2007: Equity Tax Reform Act, Articles 16 and 17). Before the introduction of the Law of Tax Equity, the pay for the 13th and 14th months and the reserve funds were also part of taxable income.

2.5.3 Exemptions

Until 2007, the main income tax exemptions for personal income related to pension income from the IESS. One of the reforms introduced in 2008 exempted taxes for the 13th and 14th months pay reserve funds, and deductions for old age and disability (Asamblea Constituyente 2007: Equity Tax Reform Act,

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[13] This was implemented under the Ley Orgánica para la Justicia Laboral y Reconocimiento del Trabajo en el Hogar, which modified the previous law entitled Ley de Seguridad Social (Consejo Directivo del IESS, 18 de junio de 2015 Resolución No. C.D.492).

Article 9, numerals 11, 12, and 15). The 13th month pay is equal to one-twelfth of the accumulated earnings received during the calendar year and the 14th month pay is equal to one UBS, which was equal to US$375 in 2017 (see Section 3.1). According to the Labour Code, Article 196, the reserve fund is equal to one additional payment which is paid to the IESS for every year worked and can be accumulated or disbursed with the monthly wage. Deductions for disability were equal to three times the basic exempted tax band until 2012 and have been twice that amount since 2013. Deductions for old age are up to twice the basic exempted band.

2.5.4 Tax deductions

Deductions for taxable income are composed of contributions to social security and, since 2008, deductions for personal expenditures (Asamblea Constituyente 2007: Equity Tax Reform Act, Article 10, numerals 9 and 16). Deductions for personal expenditures apply to expenditure in food, clothing, education, health, and housing. They cannot be higher than 50 per cent of taxable income (sum of monthly earnings from labour, contributions to social security, extra pay, and utilities participation) or 1.3 times the basic exempted band. Additionally, there are individual limits for each type of expenditure. Expenditure on food, housing, education, and clothing cannot exceed 0.325 times the basic exempted band for each category. Expenditure on health cannot exceed 1.3 times the basic exempted band.

Since January 2020, no deductions from personal expenditures are applied to incomes above US$100,000 per year.

2.5.5 Tax base

The tax base for personal income tax calculations is defined as taxable income minus exemptions, minus deductions.

2.5.6 Tax schedule

Until 2007, the tax schedule applied to the tax base was made up of five tax bands and rates of between 5 per cent and 25 per cent. The tax schedule was modified as part of the reforms introduced in 2008. As a result of the tax reforms, since 2008, the tax schedule has been more progressive, with eight tax bands and rates of between 5 and 35 per cent. Table 2.11 presents the tax schedule for the years 2011–20.

Table 2.11: Personal income tax schedule (2011–20)

%	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
0	0–9,210	0–9,720	0–10,180	0–10,410	0–10,800	0–11,170	0–11,290	0–11,270	0–11,310	0–11,315
5	9,210–11,730	9,720–12,380	10,180–12,970	10,410–13,270	10,800–13,770	11,170–14,240	11,290–14,390	11,270–14,360	11,310–14,410	11,315.01–14,416
10	11,730–14,670	12,380–15,480	12,970–16,220	13,270–16,590	13,770–17,210	14,240–17,800	14,390–17,990	14,360–17,950	14,410–18,010	14,416.01–18,018
12	14,670–17,610	15,480–18,580	16,220–19,920	16,590–19,470	17,210–20,670	17,800–21,370	17,990–21,600	17,950–21,550	18,010–21,630	18,018.01–21,639
15	17,610–35,210	18,580–37,160	19,920–38,830	19,470–39,830	20,670–41,330	21,370–42,740	21,600–43,190	21,550–43,100	21,630–43,250	21,639.01–43,268
20	35,210–52,810	37,160–55,730	38,830–58,390	39,830–59,730	41,330–61,980	42,740–64,090	43,190–64,770	43,100–64,630	43,250–64,860	43,268.01–64,887
25	52,810–70,420	55,730–74,320	58,390–77,870	59,730–79,660	61,980–82,660	64,090–85,470	64,770–86,370	64,630–86,180	64,860–86,480	64,887.01–86,516
30	70,420–93,890	74,320–99,080	77,870–103,810	79,660–106,220	82,660–110,190	85,470–113,940	86,370–115,140	86,180–114,890	86,480–115,290	86,516.01–115,338
35	93,890–	99,080–	103,810–	106,200–	110,190–	113,940–	115,140-	114,890–	115,290–	115,338.01–

Source: Authors' compilation based on SRI (2015b, 2016, 2017a, 2017b, 2019).

ECUAMOD notes

Personal income tax is simulated under the assumption of full compliance. Simulation of some sort of tax evasion could be included in future versions of the model, based on certain assumptions about people who might be evading tax payments.

2.6 Indirect taxes

2.6.1 VAT (tva_s)

VAT is regulated by the LRTI. Since 2000, the VAT rate has been set at 12 per cent.[14] In 2016, the VAT rate was increased to 14 per cent in all provinces except those affected by the earthquake in April 2016. Some goods and services considered as basic necessities, such as food products and basic services like water and electricity, are taxed at a 0 per cent rate. The full list of goods taxed at a 0 per cent rate are specified in Articles 54 and 55 of the LRTI. By 1 June 2017, VAT had been scaled back to 12 per cent.

2.6.2 Special consumption tax (tex_s)

The ICE represents a form of excise duty that applies to specific products and services, such as alcohol, tobacco products, and automobiles.

Five groups of goods are subject to ICE according to Article 82 of the LRTI:

Group 1

- Tobacco products and tobacco substitutes;
- Soda drinks;
- Perfumes and eaux de toilette;
- Video games;
- Firearms, sporting weapons, and ammunition except those acquired by the public forces; and
- Incandescent lights except those used as motor vehicle supplies, heaters and boilers for domestic use that work fully or partially with gas.

Group 2

- Motorized vehicles able to carry up to 3.5 tonnes of cargo;
- Hybrid or electric vehicles able to carry up to 3.5 tonnes of cargo; and
- Airplanes and helicopters except those intended for the commercial transport of passengers, cargo, and services; jet skis; tricars; quads; yachts; and recreation boats.

Group 3

- Paid television services; and
- Casinos, gambling rooms (bingo—slot machines), and other games of chance.

Group 4

- Fees, memberships, affiliations, and other charges for members and users of the social clubs, when the amount exceeds US$1,500 per year.

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[14] **The VAT rate changed from 10 per cent to 12 per cent on 1 January 2000 (reform to the LRTI published in the Supplement R.O. 321 of 18 November 1999).**

Group 5

- Cigarettes; and
- Alcoholic drinks, including beer.

Under Article 75 of the LRTI, three different types of tariffs may apply to goods and services subject to ICE: (i) specific tariffs, which are levied as a fixed charge per unit of good; (ii) ad valorem tariffs, which are levied as a fixed percentage of the value of the good or service; and (iii) mixed tariffs, which are a combination of both previous tariffs.

ICE for four types of goods is considered in our simulations based on the number of observations in the data for consumption of these goods. In particular, we simulate ICE for alcoholic drinks including beer, cigarettes, soda drinks, and perfumes. Table 2.12 presents the tariffs applied to these goods for the years 2011–20.

Table 2.12: Special consumption tax tariffs (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Specific tariffs										
Cigarettes (US$ per unit)	0.08	0.08	0.081	0.0862	0.0925	0.16	0.16	0.16	0.16	0.16
Beer (US$ per litre of pure alcohol)	6.2	6.08	6.93	6.93	7.1	12	12	12	12	12
Wine and spirits (US$ per litre of pure alcohol)	6.2	6.08	6.93	6.93	7.1	7.24	7.24	7.22	7.22	7.22
Soda drinks (> 25 gr sugar per liter)										0.18
Single-use plastic bags										0.04
Ad valorem tariffs (in %)										
Beer	75	75	75	75	75	75	75	75	75	75
Wine and spirits	75	75	75	75	75	75	75	75	75	75
Perfumes	20	20	20	20	20	20	20	20	20	20
Soda drinks (< 25 gr sugar per liter)	10	10	10	10	10	10	10	18	18	10
Video games										35

Note: The 20 per cent tariff on perfumes is applied to the tax base, which is calculated by applying an increment to the ex-customs price or total production price. The range of the increment applied to the ex-customs price or total production costs is: (i) 150 per cent if the price is between US$0.00 and US$1.50; (ii) 180 per cent if the price is between US$1.51 and US$3.00; (iii) 240 per cent if the price is between US$3.01 and US$6.00; and (iv) 300 per cent if the price is US$6.01 or above.

Source: Authors' compilation based on SRI (2017a, 2017b, 2018, 2020b).

ECUAMOD notes

In order to calculate the specific part of ICE for beers and alcoholic drinks, the following degrees of alcohol per litre are assumed: 4 per cent for beers, 2 per cent for light beers, 15 per cent for wine, and 35 per cent for all other spirits. For simplicity, the ad valorem part of ICE is applied to all expenditures on beer and alcoholic drinks after VAT has been deducted. This corresponds to applying the ad valorem tariff based on the sale price, whereas the tax base is based on the ex-fabric or ex-customs price.

On 28 December 2018, ICE for beers was split into three groups: craft beers, medium-size production beers, and industrial-size production beers. The survey does not contain information about these different groups. The underlying assumption is that the ICE for industrial-size production beers applies to all expenditures on beer in the data.

Expenditure codes in the data have been updated to the Classification of Individual Consumption According to Purpose (COICOP) 2018 classification.

It is not possible to simulate in detail the ICE on single-use plastic bags with ECUAMOD, because there is no information about the use of plastic bags for purchases in the input data.

3 Data

3.1 General description

ENIGHUR is a nationally representative cross-sectional survey on the income and expenditures of households in Ecuador (ANDA 2012). The survey is conducted approximately every eight years. The latest ENIGHUR is for the years 2011–12 and contains information for 39,617 households (Table 3.1). The survey follows a probabilistic two-stage sample design for nine self-represented cities and a three-stage design for the rest of the country.[15]

Table 3.1: ECUAMOD database description

ECUAMOD	EC 2011 a6
Original name	ENIGHUR 2011–12
Provider	National Institute of Statistics and Census (Instituto Nacional de Estadística y Censos, INEC)
Year of collection	2011/2012
Period of collection	04-2011/03-2012
Income reference period	2011/2012
Sample size	39,617 households/153,341 individuals
Response rate	96.79%

Source: Authors' compilation.

The National Survey of Employment, Underemployment, and Unemployment (*Encuesta Nacional de Empleo, Desempleo y Subempleo*, ENEMDU) is a nationally representative labour force survey of households in Ecuador (INEC 2018). ENEMDU is conducted on a quarterly basis, and it is structured as a rotating panel, where a sample of household is interviewed during two consecutive quarters, followed by a two-quarter period break in which a new sample of households is interviewed, and then the first sample of households is interviewed for two additional quarters before exiting the survey. We use the December 2019 and December 2020 cross-sectional ENEMDUs as input data for ECUAMOD.

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[15] **The nine self-represented cities are: Cuenca, Machala, Esmeraldas, Guayaquil, Loja, Manta, Quito, Ambato, and Santo Domingo.**

The December 2019 data contain information for 17,001 households (Table 3.2).

Table 3.2: ECUAMOD database description

ECUAMOD	EC 2019 b2
Original name	ENEMDU diciembre 2019
Provider	National Institute of Statistics and Census (Instituto Nacional de Estadística y Censos, INEC)
Year of collection	2019
Period of collection	12-2019
Income reference period	Previous month
Sample size	17,001 households/around 60,000 individuals
Response rate	Over 95%

Source: Authors' compilation.

The December 2020 data contains information for 8,756 households (Table 3.3).

Table 3.3: ECUAMOD database description

ECUAMOD	EC 2020 b2
Original name	ENEMDU diciembre 2020
Provider	National Institute of Statistics and Census (Instituto Nacional de Estadística y Censos, INEC)
Year of collection	2020
Period of collection	12-2020
Income reference period	Previous month
Sample size	8,756 households/around 30,000 individuals
Response rate	Over 95%

Source: Authors' compilation.

In both the ENIGHUR and ENEMDU surveys, the sampling unit is the dwelling, defined as the individuals or group of people living in the same housing structure (dwelling), sharing meals, and depending on a common budget. Information is collected about the household and each member of the household occupying the dwelling. Both surveys contain information on personal and household characteristics, labour and non-labour income, and public and private transfers. ENIGHUR contains more detailed income information than ENEMDU. In particular, ENIGHUR contains disaggregated information about different types of labour income (employment income, bonuses, non-agricultural self-employment income, and agricultural self-employment income), taxes and SICs, and consumption. However, ENEMDU is the main source of information for poverty and inequality analysis in Ecuador, and ENIGHUR is not collected on a regular basis.

Employment and self-employment income refer to gross monthly income before taxes. In-kind income, income from capital, private transfers, income from remittances, and cash transfer programmes (HDT and Joaquín Gallegos Lara) are also available in the survey. Contributory pensions are also reported but not disaggregated. ENIGHUR also provides information about the housing grant, income from property, and other rents.

3.2   Data adjustment

Adjustments to the data and variables are kept to a minimum. Individuals recorded as domestic employees in a household were dropped together with their children, as information about their own household (e.g., total number of children, income of partners if any, expenditures) is not available. In total, 103 individuals (0.07 per cent of the sample) were dropped from the original sample in ENIGHUR,

whereas 25 individuals (0.04 per cent of the sample) were dropped from the original sample in ENEMDU 2019 and ten individuals (0.03 per cent of the sample) from the original sample in ENEMDU 2020. No households were dropped. No adjustments to the weights were made as a result of these drops.

Some data cleaning was carried out to ensure that the relationship between household members is consistent. In particular, partners' identifiers had to be generated based on information about the identifiers of mothers and fathers, relationship to the head of the household, gender, and age of individuals. Such adjustments mostly concern households where multiple couples are observed.

Imputations were made for a small number of observations in ENIGHUR, which had inconsistent information between expenditure and quantities following the calculation of excise duties in the data preparation and which resulted in excise duties that were larger than the expenditure amount. In those cases, mean quantity was used to compute the corresponding excise duties and remove them from the expenditure data.

3.3 Imputations and assumptions

3.3.1 Time period

Information about demographic variables in ENIGHUR and ENEMDU refers to the time of data collection. In ENIGHUR, the reference period for income data depends on the source of income. Information on earnings refers to the last pay period. Similarly, information about pensions and benefits refers to receipts in the most recent relevant period (e.g. last month, last 3 months, last 12 months, etc.) before the interview. Self-employment income is based on the last 6 months. Investment income is based on the last 3-monthly receipts. For expenditures, information is collected for daily, monthly, 3-monthly, 6-monthly, and yearly expenditures. In ENEMDU, all income information refers to the month prior to the interview.

All monetary amounts in ENIGHUR and ENEMDU are expressed in monthly terms, as required for the ECUAMOD database. In the ECUAMOD calculations, it is implicitly assumed that income is received at the same rate throughout the year. However, it should be remembered that this may not be the case and, in particular, that income tax (based on annual income) simulations do not take account of changes that may happen during the year.

3.3.2 Gross incomes

The ENIGHUR and ENEMDU datasets contain information about gross monetary incomes.

3.3.3 Disaggregation of harmonized variables

The ENIGHUR and ENEMDU dataset include a single variable covering all pension payments. This variable includes contributory old-age, disability, and survivors' pensions as well as severance pay and alimony for divorce and children. This single variable is split into five in the ECUAMOD database. One variable corresponds to old-age pension, where disaggregation is based on the individual's age (attributed to individuals 60 years or older). The second variable is disability pension, attributed to individuals reporting to be disabled in the data. The third variable is survivors' pension, attributed to widows or widowers and orphans. The fourth variable is severance pay, attributed to unemployed individuals who are affiliated to national social insurance according to the data. Finally, for individuals who do not match any of the characteristics used to split the previous four variables, the amount observed in the aggregated variable is recorded under a variable for alimony.

3.3.4 Labour market formality

A variable to identify workers in formal employment (*lfo*) was created in the data, following ILO (2018). Formal employment is defined based on two conditions relating to the labour market status of the worker. Self-employed workers are considered to be in formal employment if they have a Unique Taxpayer Registration (RUC) with the Internal Revenue Service (SRI), meaning that they have accountable registrations and therefore declare and pay taxes. Employees are considered to be in informal employment if they report affiliation to the social security system.

3.3.5 Own produce in income lists

In Ecuador, the National Statistics Institute considers own produce from the self-employed agricultural (*xivot02*) and non-agricultural activities (*xivot01*) part of earnings, as is the case for in-kind benefits for employees. In the model, we therefore consider own produce as part of earnings, which enters the concept of market income. The income lists of disposable income with and without own produce are therefore equivalent. However, the user can adapt the model and subtract own produce (*xivot01* and *xivot02*) from disposable income (*ils_dispy)* to assess the effect of excluding it from this concept.

3.3.6 Imputation of expenditure data in ENEMDU

An important limitation of ENEMDU compared to ENIGHUR is that it does not contain expenditure data. Therefore, it is not possible to simulate indirect taxes or deductions from personal expenditures for the purpose of personal income tax calculations with ENEMDU. For this reason, expenditure data need to be imputed in ENEMDU as part of the data work to generate ECUAMOD's input data.

Our approach to impute expenditure data in ENEMDU draws closely on the method used by Akoguz et al. (2020) to impute expenditure data in the EUROMOD input data for EU countries. The approach follows seven main steps, which we summarize below.

Step 1. We start from two output datasets produced by ECUAMOD v1.5 based on two different input datasets but corresponding to a common policy year (e.g. 2019 or 2020). The first output is based on the ECUAMOD input data generated from ENIGHUR. Monetary variables are uprated to income and price levels of the policy year for which we want to perform the imputations (i.e. 2019 and 2020 for the ENEMDU surveys) using ECUAMOD. This first output contains all the expenditure variables needed in the model. We refer to this output as the source dataset. The second output is based on an ECUAMOD input data generated with ENEMDU but without expenditure variables. We refer to this output as the receiving dataset.

Step 2. We define broad categories of expenditure variables and convert them into shares of disposable income in the source dataset. In our case, we define 13 categories, corresponding to the 13 COICOP income lists in ECUAMOD. Aggregating expenditures under broad categories should reduce the infrequent expenditure problem. However, some households with zero expenditures might remain; they are considered as true zeros.

Step 3. We then use a two–step approach for modelling these true zeros. First, a probit model is used to estimate the probability that a household exhibits positive expenditures on each commodity aggregate. Then, an ordinary continuous regression is used to estimate the association between income shares of broad expenditure categories and household characteristics conditional on the income shares being positive. Common variables in the source and receiving data are used as explanatory variables.

Step 4. Using the estimated models, we fit expected income shares of expenditures on the broad categories conditional on household characteristics. Expected income shares are obtained by

multiplying the estimated probability of positive expenditures by the estimated income shares of expenditures conditional on expenditures being positive.

Step 5. In line with the Predictive Mean Matching (PMM) method, the fitted values are used as inputs to construct a distance function between pairs of households. More precisely, the fitted values are used as inputs for the Mahalanobis distance metric, to obtain a measure of the distance between a household h in the source data and a household g in the receiving data.

Step 6. A household h in the source dataset is then matched to a household g in the receiving dataset that has the smallest distance to h.

Step 7. The observed expenditures of household h at the highest level of disaggregation are then used as imputed values for the expenditures of household g in the receiving dataset.

3.4 Updating

Uprating factors are used to account for any time inconsistencies between the input dataset and the policy year. Each monetary variable (i.e. each income component) is updated to account for changes in the non-simulated variables that have taken place between the year of the data and the year of the simulated tax–benefit system. Uprating factors are generally based on changes in the average value of an income component between the year of the data and the policy year.

As a rule, uprating factors are provided for simulated and non-simulated income components present in the input dataset. However, in the case of simulated variables, the actual simulated amounts are used in the baseline rather than the uprated original variables in the dataset. Uprating factors for simulated variables are provided to facilitate the use of the model in cases when the user wishes to turn off the simulation of a particular variable. The list of uprating factors as well as the sources used to derive them can be found in Table 3.2.

Table 3.4: Raw indices for deriving ECUAMOD uprating factors

Index	Constant name	Value of raw indices										Source	Income component uprated by the index
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
CPI, World Bank	$HICP	104.47	109.8	112.81	116.84	121.48	123.58	124.09	123.81	124.14	124.14	http://data.worldbank.org/indicator/FP.CPI.TOTL?locations=EC	
GDP deflator, World Bank	$f_gdp_wb	130.12	136.61	140.84	145.10	141.49	144.18	146.99	149.66	149.41	149.41	http://data.worldbank.org/indicator/NY.GDP.DEFL.ZS?end=2015&locations=EC&start=1998	
GDP deflator	$f_gdp	130.12	136.61	140.84	145.10	141.37	144.18	147.00	149.66	149.40	149.14	Central Bank of Ecuador	yiy, ydv, yil, yro, ypr
CPI	$f_cpi	105.41	109.80	112.76	116.90	120.85	122.20	121.96	122.38	122.99	121.89	Central Bank of Ecuador	amrrm, amrtn, ate, aco, aca, afc, bed, bfa, tpr, tscee, tscse, tscer, tin, tis, tva, tseot, twl, tprtf, tca, xmp, xpp, xhc, xhcrt, xhcmomi, xhcot, xca, xcd, xfd, xcl, xdf, xhs, xhl, xtr, xpt, xcm, xle, xleot, xed, xrs01, xrs02, xog, xot, ypp
CPI: alcohol and tobacco	$f_cpi_at	191.10	227.30	245.20	253.60	282.90	325.85	320.96	328.76	328.77	328.77	Central Bank of Ecuador	xal, xtb01, xtb02
Average wage (monthly), US$	$f_yem	307.83	340.47	370.82	396.52	412.90	426.92	437.44	450.26	459.61	466.66	Central Bank of Ecuador	bun, bhl, kfb, kivho, yivwg, yem, yse, ypt, yot, yemre, yemnr, ysere, ysenr, yemxp, yemsv, yembo, yemot, yxp, ybo, ypv, yaj, yab, ycd, ywl, ysv, yseag, yotoc
UBS (monthly) US$	$f_minwage	264	292	318	340	354	366	375	386	394	400	Statutory parameter	bsa, bho, bcrdi, pdi, poa, psu
Unity index	$f_unit	1	1	1	1	1	1	1	1	1	1		

Notes: Uprating indices for 2018 are calculated based on growth of CPI from December 2017 to September 2018, using statistics from the Central Bank of Ecuador except for alcohol and tobacco, in which case the CPI for this specific category is used as of August 2018.

Source: Authors' compilation, based on Central Bank of Ecuador (2020).

4   Validation

4.1   Aggregate validation

ECUAMOD results have been validated against external benchmarks. Detailed comparisons of the number of people receiving a given income component and total yearly amounts are shown in Annex B. Both market incomes and non-simulated taxes and benefits in the input dataset and simulated taxes and benefits are validated against external official data. The main discrepancies between ECUAMOD results and external benchmarks are discussed in the following sub-sections. Factors that may explain the observed differences are also discussed.

4.1.1   Validation of incomes input into the simulation

Tables B1a and B1b in Annex B show the number of employed and unemployed individuals in the dataset used for EUROMOD simulations against external benchmarks. The ECUAMOD databases under-represents the number of people in work compared with official information from the ENEMDU. The discrepancy is, to some extent, due to the fact that official estimates include unpaid work, whereas our statistics consider only people in paid work. There is an important overestimation of the number of people in unemployment with the ECUAMOD data based on ENIGHUR, whereas the number of people in unemployment matches official statistics with the ENEMDU input data, as this is also the main official data used to assess employment changes in Ecuador.

Tables B2a and B2b in Annex B compare the number of recipients of either employment or self-employment income in ECUAMOD's input databases with the number of people reporting to be employees or self-employed workers in ENEMDU. No adjustment is made to reflect employment/self-employment trends in subsequent years with the ENIGHUR input data. The number of recipients of employment income in ECUAMOD represents well the number of people in employment according to ENEMDU. The number of persons receiving self-employment income is also well represented in the input dataset based on ENIGHUR compared with external information. However, the number of recipients of self-employment income in the ENEMDU input data under-represents the number of people reporting to be in self-employment. The discrepancy might be due to the fact that, among those reporting to be in self-employment, some might report zero earnings.

Tables B3a and B3b in Annex B present the aggregate amount of employment and self-employment income obtained with ECUAMOD. Comparable external statistics are not available to validate these results.

Tables B4a, B4b, B5a, and B5b report the validation of benefits included in ECUAMOD but not simulated. A comparison of the total number of recipients of three pension types is shown in Table B4 in Annex B. It is worth remembering that pension payments in ENIGHUR and ENEMDU are recorded in a single variable. Therefore, the total number of recipients of specific pension types is the result of our disaggregation of pension payments. Our disaggregation in the ENIGHUR input data results in a good representation of the number of old-age pensioners in 2011 (the baseline year) compared with external data. However, the total number of recipients of the disability and survivors' pensions is underestimated in all years, highlighting the difficulties of disaggregating information for this type of pension. No external information is available for the most recent years to be able to validate the results of the input data based on ENEMDU (Table B4b).

Tables B5a and B5b in Annex B present a comparison of aggregate amounts of non-simulated benefits, as derived from the input database and as reported by the IESS. Following the same pattern as the number of recipients, the aggregate amount of old-age pension with the ENIGHUR input data is

comparable, but over time we observe some underestimation. On the other hand, disability and survivors' pensions are underestimated, as is the number of recipients of this type of pension. Finally, the aggregate amount of housing grant derived from the ENIGHUR input data is also underestimated compared with information from the Ministry of Urban Development and Housing. No external information is available for the most recent years to be able to validate the results of the input data based on ENEMDU (Table B5b).

4.1.2 Validation of output (simulated) incomes

The number of recipients of simulated benefits and payers of simulated taxes and contributions are compared with external benchmarks in Tables B6a and B6b in Annex B. The external statistics provide information about recipients of social assistance (HDT) and the disability carer benefit (Joaquín Gallegos Lara), as well as the number of members to social security and payers of income tax.

Table B6a shows that for HDT, there is an underestimation of around 20 per cent of recipients in 2011. In order to assess eligibility for HDT, we replicated the SR index with the input data and fixed the threshold of eligibility by identifying the same number of people below the official threshold. The underestimation of recipients of the HDT could be related to discretion as to who is eligible for the transfer, which cannot be captured in our simulations. Results for the disability carer benefit, which are also based on actual benefit receipt in the data, are underestimated compared with external sources. Disability carer benefit is only partially simulated as eligibility depends on the severity of disability and this information is unavailable in the data.

The number of tax payers and employee SIC payers is underestimated compared with data from the IESS and the SRI, as shown in Table B6. The underestimation is important for payers of armed forces and police SICs and even more so for payers of self-employed contributions. It is important to note that external statistics for the number of SIC payers disaggregated between employees and self-employed are only available for 2011 and 2012. Aggregate information on total payers of SICs is disaggregated for other years based on the shares of employees and self-employed payers in 2012.

Unfortunately, no external information is available for the most recent years to be able to validate the results of the input data based on ENEMDU (Table B6b).

Tables B7a, B7b, and B7c in Annex B present a set of figures related to aggregate annual expenditure in social benefits and revenue from taxes and SICs. Results for aggregate expenditures on benefits with the ENIGHUR input data follow the same pattern as the number of recipients of the benefits. The underestimation of amounts of simulated social assistance compared with both the input data (Table B7a) and external statistics (Table B7b) is around 7 per cent in 2011. The underestimation of disability carer benefit compared with external sources follows a very similar pattern to that observed for the number of recipients (Table B7b). Aggregate expenditures on simulated social assistance with the ENEMDU input data (Table B7c) match those of the original data in 2019 well but result in a 15 per cent underestimation in 2020.

Tables B7a and B7b further show simulated aggregate amounts of personal income tax and SICs by type of payer with the ENIGHUR input data. Our simulations overestimate the amount of taxes and SICs with respect to those obtained with the original data (Table B7a). This is probably related to the difficulties of recording this type of deduction in surveys. On the other hand, compared with external sources, we observe an underestimation of tax and social contribution amounts (Table B7b). The underestimation follows the pattern observed in terms of the number of tax payers and social insurance contributors. The underestimation of income tax and employee SICs is not too large, with a gap of around 20 per cent. The underestimation of self-employed and armed forces SICs is more important, in line with the underestimation of the number of payers. The underestimation of income tax and SICs is likely to be related to the fact that, in general, surveys fail to properly capture the top of the income distribution and this is particularly the case for developing countries such as Ecuador. As

was the case for the number of payers, external statistics of SIC amounts disaggregated between employees and the self-employed are only available in 2011 and 2012. Aggregate information on total SICs is disaggregated for other years based on the shares of employees' and self-employed contributions in 2012.

Additionally, Table B7b provides a comparison of the aggregate amount of VAT and excise duties on certain products with the ENIGHUR input data. Compared with external statistics, VAT and excise duties are generally underestimated by around 50 per cent. However, it is worth remembering that official VAT statistics include payments by firms and may also have export destinations, whereas our simulation results are based on household consumption only. Excises on cigarettes present an important underestimation, with our simulated aggregate amounts representing only about 18 per cent of the aggregate amount of official statistics. On the other hand, excises on perfumes are overestimated by around 36 per cent in 2011.

Unfortunately, no external information is available for the most recent years to be able to validate the simulated results of aggregate expenditure and revenue with the input data based on ENEMDU (Table B7b).

4.2   Income distribution

The results presented in this section focus on income inequality and poverty. The results are computed for individuals according to their household disposable income (HDI), equivalized by the number of people in the household. HDI is calculated as the sum of all income sources of all household members net of income tax and SICs. Equivalizing HDI by the number of members of the household is the approach used by the National Institute for Statistics and Census (*Instituto Nacional de Estadística y Censos*, INEC) to calculate income poverty.

Additionally, for the case of relative income poverty we provide results based on HDI equivalized by the 'modified OECD equivalence scale', which is the approach used to calculate poverty in developed economies. The weights in the scale are: first adult = 1, additional individuals aged 14 years and above = 0.5, and additional individuals aged below 14 years = 0.3.

The comparison of the poverty and inequality results needs to be treated with care because the definitions of household income used in ECUAMOD and those used by INEC are not completely comparable. In particular, the approach taken by INEC, based on ENEMDU, is to add back the deductions from SICs and income tax to employment income. Moreover, some social benefits are not included in the income concept used by INEC, as they are not available in ENEMDU. These are compensations for accidents, scholarships, housing grants, and termination payments. Finally, income information in ENIGHUR is recorded at a more disaggregated level than in ENEMDU, which could improve the precision of income information. In addition to inequality and poverty statistics from INEC, we also compare ECUAMOD results to those obtained directly from ENIGHUR for 2011 using a definition of HDI similar to that of ECUAMOD.

4.2.1   Income inequality

Tables B8a and B8b in Annex B compare income inequality from the ECUAMOD results and official statistics based on ENEMDU using the Gini coefficient as an inequality measure. Income inequality obtained with ECUAMOD slightly underestimates the official estimates based on ENEMDU. A similar underestimation is observed when the ECUAMOD results are compared with those obtained directly from ENIGHUR data for 2011.

4.2.2 Poverty rates

Tables B8a and B8b also present statistics on poverty and extreme poverty in Ecuador, derived using ECUAMOD simulations and those published by INEC. Two issues are worth highlighting. First, the official poverty estimates for Ecuador use the concept of absolute poverty. Second, the official estimates are based on ENEMDU. As previously mentioned, the income concept used for the calculation of poverty is not exactly the same as that used in ECUAMOD, and ENIGHUR contains much more detailed information on certain income components. The absolute poverty lines used for the indicators are presented in Table 4.1.

Table 4.1: Poverty and extreme poverty lines in monthly US$ (2011–20)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Poverty	72.87	76.34	78.1	81.04	83.79	84.68	84.49	84.79	84.82	84.82
Extreme poverty	41.06	43.02	44.01	45.67	47.22	47.72	47.62	47.78	47.80	47.80

Source: Authors' compilation based on INEC (2016a, 2018, 2019a, 2021a).

Table B8a shows that compared with official poverty estimates, ECUAMOD results based on the ENIGHUR input data underestimate poverty by around 27 per cent, whereas the underestimation of extreme poverty is more important (around 50 per cent). The discrepancy is mainly driven by the fact that ENIGHUR, on which ECUAMOD input data are based for policy years 2011–18, contain more detailed income information than ENEMDU, which is used to calculate the official poverty estimates. In fact, ECUAMOD results based on the ENIGHUR input data match those obtained directly from ENIGHUR data for 2011 better, with the poverty and extreme poverty rates only slightly underestimated. Poverty and extreme poverty estimates are also compared for urban and rural populations. In all cases, poverty is underestimated in ECUAMOD based on the ENIGHUR input data, compared with official statistics based on ENEMDU, whereas a better fit is observed with respect to ENIGHUR data. Table B8b confirms the disaligment between ENIGHUR and ENEMDU data. ECUAMOD poverty and extreme poverty results based on the ENEMDU input data match the official statistics in 2019 well, whereas in 2020, there is only a slight overestimation of poverty and a slight underestimation of extreme poverty.

4.3   Statistics Presenter

A series of variables and income lists were created in ECUAMOD for the use of the Statistics Presenter tool in the EUROMOD platform. This section describes the elements implemented in the model for the use of the tool

Two constants were created in the model to define the values of the poverty line (*$Povline*) and extreme poverty line (*$ExtPovline*) in Ecuador, according to the values in Table 4.1.

A variable defining the size of the household (*ses*) was created in the model to be used as an equivalence scale for the household in line with the methodology used by INEC, where poverty and inequality are calculated based on disposable income per capita. The variable is attributed to the head of the household as defined in the survey (*dhh*), whereas for all other household members the value zero is attributed.

The following income lists were created in the model for the use of the Statistics Presenter tool:

- *ils_taxind*: indirect taxes, containing VAT and special consumption tax (ICE);
- *ils_sic*: social security contributions by employees, self-employed, and employers;
- *ils_bch*: child-related benefits—this income list is empty in ECUAMOD as there are no specific child-related benefits in Ecuador;

- *ils_bsa*: social assistance-related benefits, containing the Human Development Transfer and housing grants;
- *ils_bsu*: orphan and widowhood-related benefits, containing survivors' pensions (*montepío*);
- *ils_bdi*: disability-related benefits, containing disability pensions and the Joaquín Gallegos Lara transfer;
- *ils_bun*: unemployment-related benefits, containing severance payment;
- *ils_taxsimnoreform*: composed of all taxes simulated (no reform scenario);
- *ils_bensimnoreform*: composed of all benefits simulated (no reform scenario);
- *ils_siceenoreform*: composed of all employee SICs simulated (no reform scenario);
- *ils_sicsenoreform*: composed of all self-employed SICs simulated (no reform scenario);
- *ils_dispyx*: disposable income with imputed values for own produce (food and non-food)—in ECUAMOD, as mentioned above, this income list is identical to *ils_dispy*, which already contains own produce (*xivot01* and *xivot02*) as these variables are part of original income (*ils_origy*);
- *ils_dispyx_pf*: post-fiscal income taking account of own produce, defined as disposable income accounting for own produce (*ils_dispyx*) minus indirect taxes (*ils_taxind*);
- *ils_dispy_pf*: post-fiscal income, defined as disposable income (*ils_dispy*) minus indirect taxes (*ils_taxind*);
- *ils_con*: simulated consumption, defined as household expenditure as recorded in the data (*xhh*) minus simulated taxes (*ils_taxsim*), minus simulated employee SICs (*ils_sicee*), minus simulated self-employed SICs (*ils_sicse*), plus direct taxes under no reform scenario (*ils_taxsimnoreform*), plus employee SICs under no reform scenario (*ils_siceenoreform*), plus self-employed SICs under no reform scenario (*ils_sicsenoreform*), plus simulated benefits (*ils_bensim*), minus benefits under no reform scenario (*ils_bensimnoreform*); and
- *ils_con_pf*: post-fiscal simulated consumption, defined as simulated consumption (*ils_con*) minus simulated indirect taxes (*ils_taxind*).

4.4 Summary of 'health warnings'

Pension payments in ENIGHUR and ENEMDU are recorded in a single variable. In order to provide specific information on different types of pension income (e.g. old-age pensions, disability pensions, survivors' pensions), the information from ENIGHUR and ENEMDU was disaggregated based on the personal characteristics of the recipients of pension payments. Therefore, there will inevitably be some bias due to benefit splitting.

There is under-representation of people with higher incomes in the ENIGHUR and ENEMDU surveys, which is likely to result in an underestimation of personal income tax and SICs.

The comparison of poverty and inequality results should be regarded with care when the ENIGHUR input data is used for simulations of policy years 2011–18. Income information in ENIGHUR is much more detailed than that of ENEMDU which is used to calculate official poverty and inequality estimates. Using the original ENIGHUR data, poverty estimates are considerably lower than those obtained with ENEMDU. Due to the discrepancies between both data sources, ECUAMOD results based on the ENIGHUR inpu data underestimate poverty and inequality compared with ENEMDU.

The household income concept used for calculations of official poverty statistics also differs from the concept of HDI used in ECUAMOD. For instance, taxes and SICs are not deducted from the measure of income used for poverty and inequality calculations.

Extreme poverty rates are importantly underestimated in ECUAMOD based on the ENIGHUR inpu data, compared with official statistics based on ENEMDU, but only a minor underestimation is observed compared with statistics from ENIGHUR data in 2011.

The policy systems provided in ECUAMOD v2.0 reflect policies as they were in place as of June 1 of that specific year, providing a 'snapshot' of the situation of the tax-benefit system at this date for each policy year simulated. The COVID-related Family Protection Grant was in force on the cut-off date, but the duration of the benefit payment lasted only two months. To take into account the duration of the benefit, the Family Protection Grant has been implemented using the Full Year Adjustment (FYA) switch in EUROMOD. This means that the total benefit amount over the year is divided by 12 months (i.e. US$120/12). The switch is set to 'on' in the baseline as the Family Protection Grant was in force on the cut-off date.

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Annex A: Institutions and Social programmes related to HDT up to 2017

Institutions	Programmes
Ministerio de Inclusión Económica y Social (MIES)	HDT Mothers (*Bono de Desarrollo Humano* - BDH)
	HDT Elderly (*Pensión para Adultos Mayores*)
	HDT Disabilities (*Pensión para Personas con Discapacidad*)
	Pension for Senior People: 'My best years' (*Pensión para Adultos Mayores "Mis mejores años"*)
	Emergency bonus (*Bono de Emergencia para desastres*)
	Life insurance that includes funeral expenses (*Seguro de vida que incluye gastos funerarios para titular del BDH*)
	Human Development Credit (*Crédito de Desarrollo Humano*)
	Family Plan (*Plan Familia*)
	Joaquín Gallegos Lara bonus (*Bono Joaquín Gallegos Lara* - BJGL)
Secretaría de Educación Superior, Ciencia, Tecnología e Innovación – SENESCYT	National Scholarship Programme 'Eloy Alfaro' (*Programa de Becas Nacionales 'Eloy Alfaro'*)
Instituto de Fomento al Talento Humano – IFTH	Financing and complementary scholarships according to socioeconomic conditions (*Financiamiento – Y becas complementarias según condiciones socioeconómica*)
Ministerio de Salud Pública - MSP	Contingency coverage for humanitarian assistance (*Cobertura de contingencias para la atención humanitaria*)
Ministerio de Desarrollo Urbano y Vivienda – MIDUVI	Housing bonus (*El Bono de Vivienda*)
Secretaría Técnica "Plan Toda una Vida" - STPTV	Home for Everyone Programme *(Programa Casa para Todos)*
	'Las Manuelas' Mision (*Misión 'Las Manuelas'*)
	'Toda una Vida' Mision (*Misión Toda una Vida*)
Corporaci[on Nacional de Telecomunicaciones CNT	Mobile prepaid promotional plan (*Plan Promocional Prepago Mi Compañerito*)
Super-market chains: Tía, Akí y Mi Comisariato	8% discount on food and basic necessities/goods once every month on purchases of up to US$60 *(Descuento de 8% en alimentos y productos de primera necesidad por una vez al mes en compras de hasta US$60)*

Source: Authors' compilation, based on SENPLADES (2018).

Annex B: Macrovalidation tables

Table B1a: Number of employed and unemployed (in thousands)

	ECUAMOD	External								Ratio							
	2011	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Number of employed	5,723.3	6,304.8	6,424.8	6,664.2	6,921.1	7,140.6	7,463.6	7,712.2	7,731.0	0.91	0.89	0.86	0.83	0.80	0.77	0.74	0.74
Number of unemployed	318.9	276.8	276.2	288.7	273.4	357.9	410.4	373.9	296.1	1.15	1.15	1.10	1.17	0.89	0.78	0.85	1.08

Note: The population of reference of INEC statistics is working age population aged 15 years or more.

Source: Authors' compilation based on ECUAMOD calculations and INEC (2016b, 2018).

Table B1b: Number of employed and unemployed (in thousands)

	ECUAMOD		External		Ratio	
	2019	2020	2019	2020	2019	2020
Number of employed	6,741.6	6,488.5	7,865.8	7,688.9	0.86	0.84
Number of unemployed	311.1	401.3	311.1	401.3	1.00	1.00

Note: The population of reference of INEC statistics is working age population aged 15 years or more.

Source: Authors' compilation based on ECUAMOD calculations and INEC (2019b, 2021b).

Table B2a: Market income in EUROMOD: number of recipients (in thousands)

	ECUAMOD	External								Ratio							
	2011	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Employment income	3,840.5	3,656.8	3,816.4	4,158.5	4,304.9	4,420.1	4,396.0	4,542.5	4,553.6	1.05	1.01	0.92	0.89	0.87	0.87	0.85	0.84
Self-employment income	2,588.4	2,648.0	2,608.5	2,505.8	2,616.2	2,720.6	3,067.5	3,169.7	3,177.5	0.98	0.99	1.03	0.99	0.95	0.84	0.82	0.81

Note: The population of reference of INEC statistics is working age population aged 15 years or more.

Source: Authors' compilation based on ECUAMOD calculations and INEC (2016b, 2016c, 2018).

Table B2b: Market income in EUROMOD: number of recipients (in thousands)

	ECUAMOD		External		Ratio	
	2019	2020	2019	2020	2019	2020
Employment income	3,655.9	3,309.0	3,829.4	3,537.7	0.95	0.94
Self-employment income	2,672.5	2,623.2	3,055.5	3,162.5	0.87	0.83

Note: The population of reference of INEC statistics is working age population aged 15 years or more.

Source: Authors' compilation based on ECUAMOD calculations and INEC (2019b, 2021b).

Table B3a: Market income in EUROMOD: annual amounts (in millions)

	ECUAMOD								External								Ratio							
	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Employment income	17,588	19,452	21,187	22,655	23,591	24,392	24,993	25,725	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Self-employment income	9,495	10,501	11,437	12,230	12,735	13,168	13,492	13,888	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations.

Table B3b: Market income in EUROMOD: annual amounts (in millions)

	ECUAMOD		External		Ratio	
	2019	2020	2019	2020	2019	2020
Employment income	23,072	19,450	N/A	N/A	N/A	N/A
Self-employment income	11,266	9,575	N/A	N/A	N/A	N/A

Note: N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations.

Table B4a: Tax–benefit instruments included but not simulated in EUROMOD: number of recipients/payers (in thousands)

	ECUAMOD	External								Ratio							
	2011	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Old-age pensions[a]	291.6	238.1	258.3	276.3	305.4	331.4	363.1	397.4	420.0	1.22	1.13	1.06	0.95	0.88	0.80	0.73	0.69
Disability pensions[a]	11.0	21.2	23.1	24.9	27.7	30.0	32.5	34.6	N/A	0.52	0.48	0.44	0.40	0.37	0.34	0.32	0.32
Survivors' pensions[a]	23.8	110.2	115.9	121.4	127.8	138.5	150.1	154.7	N/A	0.22	0.21	0.20	0.19	0.17	0.16	0.15	0.15
Housing grant	9.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations; [a]IESS (2015e, 2019).

Table B4b: Tax–benefit instruments included but not simulated in EUROMOD: number of recipients/payers (in thousands)

	ECUAMOD		External		Ratio	
	2019	2020	2019	2020	2019	2020
Old-age pensions	694.3	708.0	N/A	N/A	N/A	N/A
Disability pensions	0.0	0.0	N/A	N/A	N/A	N/A
Survivors' pensions	20.3	19.0	N/A	N/A	N/A	N/A
Housing grant	0.0	0.0	N/A	N/A	N/A	N/A

Note: N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations.

Table B5a: Tax–benefit instruments included but not simulated in EUROMOD: annual amounts (in millions)

	ECUAMOD								External								Ratio							
	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Old-age pensions[a]	1,184	1,310	1,427	1,525	1,588	1,642	1,682	1,732	1,152	1,361	1,736	2,108	2,400	2,724	3,049	N/A	1.03	0.96	0.82	0.72	0.66	0.60	0.55	N/A
Disability pensions[a]	33	37	40	43	45	46	47	49	63	73	86	103	115	128	142	N/A	0.53	0.51	0.47	0.42	0.39	0.36	0.33	N/A
Survivors' pensions[a]	56	62	67	72	75	77	79	82	218	249	277	315	345	377	409	N/A	0.26	0.25	0.24	0.23	0.22	0.21	0.19	N/A
Housing grant[b]	38	42	46	49	51	53	54	56	119	168	162	104	126	121	116	N/A	0.32	0.25	0.28	0.47	0.40	0.44	0.47	N/A

Note: N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations; [a]IESS (2015e, 2019), and [b]MEF (2015).

Table B5b: Tax–benefit instruments included but not simulated in EUROMOD: annual amounts (in millions)

	ECUAMOD		External		Ratio	
	2019	2020	2019	2020	2019	2020
Old-age pensions	3,934	3,579	N/A	N/A	N/A	N/A
Disability pensions	0	0	N/A	N/A	N/A	N/A
Survivors' pensions	64	53	N/A	N/A	N/A	N/A
Housing grant	0	0	N/A	N/A	N/A	N/A

Note: N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations.

Table B6a: Tax–benefit instruments simulated in EUROMOD: number of recipients/payers (in thousands)

	ECUAMOD								ENIGHUR	Ratio	External								Ratio							
	2011	2012	2013	2014	2015	2016	2017	2018	2011	2011	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Benefits																										
Social assistance benefits[a]	1,538	1,538	1,538	1,118	1,118	1,118	1,118	999	1,681	0.92	1,854	1,896	1,717	1,120	1,099	1,023	993	631	0.83	0.81	0.90	1.00	1.02	1.09	1.13	1.77
Disability carer benefit[b]	9	9	9	9	9	9	9	9	9	1.00	14	17	20	20	23	22	23	30	0.62	0.52	0.44	0.44	0.39	041	0.39	0.29
Taxes and social insurance contributions (SICs)																										
Income tax[c]	334	371	406	446	450	452	476	505	204	1.64	476	498	507	513	494	426	431	459	0.70	0.74	0.80	0.87	0.91	1.06	1.05	0.99
Employee SIC[d]	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	1,836	1.16	2,449	2,687	2,856	3,015	2,958	2,846	2,890	2,890	0.87	0.79	0.75	0.71	0.72	0.75	0.74	0.74
Armed forces and police SIC	56	56	56	56	56	56	56	56	N/A	1	84	87	90	93	87	92	101	101	0.67	0.64	0.62	0.60	0.64	0.61	0.55	0.55
Self-employed SIC[d]	255	255	255	255	255	255	255	255	74	3.46	341	397	432	464	505	531	539	559	0.75	0.64	0.59	0.55	0.51	0.48	0.47	0.46
Employers SIC	1,997	1,997	1,997	1,997	1,997	1,997	1,997	1,997	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Government SIC for armed forces and police	56	56	56	56	56	56	56	56	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: External statistics of SIC payers disaggregated between employees and self-employed are only available in 2011 and 2012. Aggregate information on total payers of SICs is disaggregated for other years based on the shares of employees and self-employed payers in 2012. N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations, [a]*Registros del Programa Bono de Desarrollo Humano* – MIES (n.d.a), [b]*Informe de Gestión* – MIES, [c]estimates supplied by Nicolás Oliva and Nestor Villacreses based on administrative data using the personal income tax calculator of the Internal Revenue Service (SRI), and [d]IESS (2013, 2014c, 2019).

Table B6b: Tax–benefit instruments simulated in EUROMOD: number of recipients/payers (in thousands)

	ECUAMOD		ENEMDU		Ratio		External		Ratio	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Benefits										
Social assistance benefits	701	771	929	1,168	0.75	0.66	N/A	N/A	N/A	N/A
Disability carer benefit	28	38	28	38	1.00	1.00	N/A	N/A	N/A	N/A
Taxes and SICs										
Income tax	404	287	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Employee SIC	2,625	2,299	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Armed forces and police SIC	46	53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Self-employed SIC	282	209	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Employers SIC	2,287	1,917	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Government SIC for armed forces and police	46	53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: External statistics of SIC payers disaggregated between employees and self-employed are only available in 2011 and 2012. Aggregate information on total payers of SICs is disaggregated for other years based on the shares of employees and self-employed payers in 2012. N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations,

Table B7a: Tax–benefit instruments simulated in EUROMOD: annual amounts (in millions)

	ECUAMOD								ENIGHUR								Ratio							
	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Benefits																								
Social assistance benefits	661	661	944	686	686	686	686	1,092	706	780	850	909	946	978	1,002	1,032	0.94	0.85	1.11	0.75	0.72	0.70	0.68	1.06
Disability carer benefit	26	26	26	26	26	26	26	26	24	26	29	31	32	33	34	35	1.07	0.97	0.89	0.83	0.80	0.77	0.76	0.73
Taxes and SICs																								
Income tax	639	738	835	929	966	1,001	1,050	1,063	171	178	182	189	196	198	1197	198	3.75	4.16	4.57	4.91	4.94	5.06	5.32	5.37
Employee SIC	1,478	1,635	1,781	1,923	2,002	2,070	1,970	2,028	1,322	1,377	1,414	1,466	1,516	1,533	1,530	1,535	1.12	1.19	1.26	1.31	1.32	1.35	1.29	1.32
Armed forces and police SIC	218	241	263	281	293	302	310	319	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Self-employed SIC	332	367	399	427	445	460	471	485	268	279	286	297	307	310	310	311	1.24	1.32	1.40	1.44	1.45	1.48	1.52	1.52
Employers SIC	1,417	1,568	1,707	1,826	1,901	1,966	2,014	2,073	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Government SIC for armed forces and police	246	272	296	317	330	341	350	360	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VAT	1,689	1,759	1,807	1,873	1,936	2,257	1,957	1,965	592	617	634	657	679	687	685	688	2.85	2.85	2.85	2.85	2.85	3.29	2.86	2.86

Notes: N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations and ENIGHUR.

Table B7b: Tax–benefit instruments simulated in EUROMOD: annual amounts (in millions)

	ECUAMOD								External								Ratio							
	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Benefits																								
Social assistance benefits[a]	661	661	944	686	686	686	686	1.092	724	755	1,026	812	635	609	N/A	N/A	0.91	0.88	0.92	0.84	1.08	1.12	N/A	N/A
Disability carer benefit[b]	26	26	26	26	26	26	26	26	41	49	58	58	62	62	N/A	N/A	0.62	0.52	0.44	0.44	0.41	0.41	N/A	N/A
Taxes and SICs																								
Income tax[c]	639	738	835	929	966	1,001	1,050	1,063	784	856	935	1,022	1,114	N/A	N/A	N/A	0.82	0.86	0.89	0.91	0.87	N/A	N/A	N/A
Employee SIC[d]	1,478	1,635	1,781	1,923	2,002	2,070	1,970	2,028	1,508	1,799	2,071	2,326	2,498	2,470	2,547	N/A	0.98	0.91	0.86	0.83	0.80	0.84	0.77	N/A
Armed forces and police SIC[d]	218	241	263	281	293	302	310	319	416	442	472	505	528	559	730	N/A	0.52	0.55	0.56	0.56	0.55	0.54	0.42	N/A
Self-employed SIC[d]	332	367	399	427	445	460	471	485	176	212	244	298	353	380	403	N/A	1.88	1.73	1.64	1.43	1.26	1.21	1.17	N/A
Employers SIC	1,417	1,568	1,707	1,826	1,901	1,966	2,014	2,073	1,557	1,842	2,114	2,338	2,488	2,455	2,505	N/A	0.91	0.85	0.81	0.78	0.76	0.80	0.80	N/A
Government SIC for armed forces and police[d]	246	272	296	317	330	341	350	360	455	471	502	459	488	491	497	N/A	0.54	0.58	0.59	0.69	0.68	0.69	0.70	N/A
VAT[e]	1,689	1,759	1,807	1,873	1,936	2,257	1,957	1,965	3,073	3,455	4,096	4,513	4,778	4,375	4,672	4,789	0.55	0.51	0.44	0.42	0.41	0.52	0.42	0.41
ICE alcohol[e]	10	10	11	11	12	12	12	12	24	34	43	45	44	35	38	N/A	0.43	0.31	0.26	0.25	0.27	0.34	0.31	N/A
ICE beer[e]	48	49	52	53	55	64	65	64	135	152	170	166	188	194	237	N/A	0.36	0.32	0,31	0.32	0.29	0.33	0.27	N/A
ICE cigarettes[e]	22	22	23	24	26	45	45	45	149	156	176	178	195	158	126	N/A	0.15	0.14	0.13	0.14	0.13	0.28	0.36	N/A
ICE soda drinks[e]	20	21	22	22	23	24	24	42	43	51	57	53	59	109	103	N/A	0.47	0.41	0.38	0.42	0.39	0.22	0.23	N/A
ICE perfume[e]	27	28	28	30	31	31	31	31	20	14	8	19	44	323	24	N/A	1.36	1.93	3.76	1.51	0.70	1.33	1.26	N/A

Notes: External statistics of SIC payers disaggregated between employees and self-employed are only available in 2011 and 2012. Aggregate information on total payers of SICs is disaggregated for other years based on the shares of employees and self-employed payers in 2012. N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations, [a]*Registros del Programa Bono de Desarrollo Humano* – MIES (n.d.b), [b]*Informe de Gestión* – MIES (n.d.b), [c]the estimates supplied by Nicolás Oliva and Nestor Villacreses based on administrative data using the personal income tax calculator of the SRI, [d]IESS (2013, 2014c, 2019), [e]SRI (2015a), and ISSFA (2019).

Table B7c: Tax–benefit instruments simulated in EUROMOD: annual amounts (in millions)

	ECUAMOD		ENEMDU		Ratio		External		Ratio	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Benefits										
Social assistance benefits	760	828	760	975	1.00	0.85	N/A	N/A	N/A	N/A
Disability carer benefit	82	110	82	117	0.99	0.94	N/A	N/A	N/A	N/A
Taxes and SICs										
Income tax	456	493	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Employee SIC	1,605	1,329	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Armed forces and police SIC	164	174	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Self-employed SIC	508	342	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Employers SIC	1,740	1,443	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Government SIC for armed forces and police	185	196	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VAT	1,357	1,872	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ICE alcohol	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ICE beer	35	45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ICE cigarettes	45	55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ICE soda drinks	39	48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ICE perfume	22	16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: External statistics of SIC payers disaggregated between employees and self-employed are only available in 2011 and 2012. Aggregate information on total payers of SICs is disaggregated for other years based on the shares of employees and self-employed payers in 2012. N/A, not available.

Source: Authors' compilation based on ECUAMOD calculations.

Table B8a: Absolute poverty rates and income inequality

	ECUAMOD								ENIGHUR	Ratio	External (ENEMDU)								Ratio							
	2011	2012	2013	2014	2015	2016	2017	2018	2011	2011	2011	2012	2013	2014	2015	2016	2017	2018	2011	2012	2013	2014	2015	2016	2017	2018
Poverty																										
Total	20.8	18.9	15.7	15.7	15.6	15.0	14.2	11.4	21.6	0.96	28.6	27.3	25.6	22.5	23.3	22.9	21.5	21.5	0.73	0.69	0.61	0.70	0.67	0.65	0.66	0.47
Urban	12.5	10.9	8.6	8.8	8.6	8.2	7.6	6.3	13.2	0.94	17.4	16.1	17.6	16.4	15.7	15.7	13.2	13.2	0.72	0.68	0.49	0.54	0.55	0.52	0.58	0.40
Rural	37.6	35.0	29.9	29.6	29.6	28.8	27.4	21.7	38.5	0.98	50.9	49.1	42.0	35.3	39.3	38.2	39.3	39.3	0.74	0.71	0.71	0.84	0.75	0.75	0.70	0.51
Extreme poverty																										
Total	5.7	5.3	4.0	4.0	4.1	3.9	3.7	2.6	6.1	0.95	11.6	11.2	8.6	7.7	8.5	8.7	7.9	7.9	0.49	0.48	0.46	0.53	0.48	0.45	0.47	0.29
Urban	2.3	2.0	1.5	1.5	1.5	1.5	1.4	1.2	2.6	0.85	5.0	5.0	4.4	4.5	4.4	4.5	3.3	3.3	0.45	0.41	0.33	0.34	0.35	0.32	0.42	0.25
Rural	12.7	11.9	9.0	9.1	9.1	8.8	8.4	5.6	13.3	0.98	24.6	23.3	17.4	14.3	17.0	17.6	19.7	19.7	0.52	0.51	0.52	0.64	0.54	0.50	0.43	0.31
Inequality																										
Gini	46.1	46.2	45.7	46.1	46.2	46.2	46.3	46.3	47.3	0.97	47.3	47.7	48.5	46.7	47.6	46.6	45.9	45.9	0.98	0.97	0.94	0.99	0.97	0.99	1.01	0.97

Notes: Computed for individuals according to their household income equivalized by the number of household members. ECUAMOD household income corresponds to household disposable income (HDI) calculated as the sum of all income sources of all household members net of income tax and SICs. INEC household income corresponds to the sum of all income sources (available in ENEMDU) of all household members but using employment income before taxes and SICs.

Source: Authors' compilation based on ECUAMOD calculations and ENIGHUR; external figures come from INEC (2016a), based on ENEMDU.

Table B8b: Absolute poverty rates and income inequality

	ECUAMOD		External (ENEMDU)		Ratio	
	2019	2020	2019	2020	2019	2020
Poverty						
Total	25.1	33.9	25.0	32.4	1.00	1.05
Urban	17.6	26.6	17.2	25.1	1.02	1.06
Rural	40.9	49.1	41.8	47.9	0.98	1.03
Extreme poverty						
Total	8.8	14.2	8.9	14.9	0.99	0.95
Urban	4.5	9.1	4.3	9.0	1.05	1.01
Rural	18.0	25.1	18.7	27.5	0.96	0.91
Inequality						
Gini	45.8	48.4	47.3	50.0	0.97	0.97

Notes: Computed for individuals according to their household income equivalized by the number of household members. ECUAMOD household income corresponds to household disposable income (HDI) calculated as the sum of all income sources of all household members net of income tax and SICs. INEC household income corresponds to the sum of all income sources (available in ENEMDU) of all household members but using employment income before taxes and SICs.

Source: Authors' compilation based on ECUAMOD calculations and ENEMDU; external figures come from INEC (2019a, 2021a), based on ENEMDU.