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The role of mutuals and community-based insurance in social health protection systems: International experience on delegated functions

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Abstract The institutional architecture for the provision of social health protection varies across countries, as do the actors and organizations involved. In some countries, mutual benefit societies and community-based health insurance organizations (CBHI) play a role in this area. In the 1990s, these were promoted particularly as a means of extending social security coverage, especially in sub-Saharan Africa. In the current context, the adoption of the 2030 Agenda for sustainable development, as well as renewed political will to

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realize universal coverage, has led to a questioning of the role of mutuals/CBHI. However, the literature on the roles they play in national social security systems remains limited. For this scoping review, 49 documents were analysed, covering 18 countries worldwide, focused on the delegation of functions to mutuals/CBHI in national social health protection systems. The results reveal the dynamics of the delegation of functions within social protection systems over time and their implementation processes. These provide areas for reflection that can inform policy processes.

Keywords mutual benefit society, social protection, health, social security schemes, health insurance, international

Introduction

Social health protection is a human right rooted in the right to social security and the right to health. It is formalized in international social security standards (ILO, 2020). It is defined as access to health care without financial hardship and guaranteed by the State across the life course, alongside income security in the event of sickness or maternity (ILO, 2020). In that regard, it contributes to the Sustainable Development Goals (SDGs) of the 2030 Agenda, in particular indicators 1.3 and 3.8 on universal social protection and universal health coverage (Bayarsaikhan, Tessier and Ron, 2022).

International standards in social health protection are not inherently prescriptive in terms of the institutional and administrative arrangements chosen by each State to implement these guarantees, provided that the arrangements respect certain guiding principles (ILO, 2020). Any system must be adapted to domestic circumstances to be acceptable and effective. In practice, the chosen administrative architecture for the provision of social health protection varies from country to country. Mutual benefit societies (mutuals) and community-based health insurance organizations (CBHI) may play an important role in this in some countries (Schremmer et al., 2009).

Historically, mutuals developed in Europe and Latin America in contexts where the public social protection system was nascent (Dreyfus, 2017). In the 1990s, mutuals/CBHI were promoted in sub-Saharan Africa as a solution to expand social health protection coverage (Schremmer et al., 2009). In a context where countries seek to realize universal coverage to achieve the SDGs, questions are raised about

the role played by mutuals in national social health protection systems. However, the available literature offers few answers on the topic, in particular regarding the functions that may be delegated to mutuals/CBHI.

This article presents the results of a scoping review to produce a global overview of the available knowledge concerning the delegation of functions to mutuals/CBHI in national social health protection systems. The article proposes areas for reflection to inform current policy processes and is structured as follows. First, the methodology of the scoping review is set out. Second, main results are presented and, in turn, those results are discussed in light of current policy debates before concluding the article.

Methods

A scoping review makes it possible to examine a body of evidence on a subject that has been little studied (Arksey and O'Malley, 2005; Belaid and Ridde, 2020; Dagenais et al., 2021). The method proposed by Arksey and O'Malley (2005) and the PRISMA system (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Tricco et al., 2018) have been used. This study has been conducted with the assistance of Covidence.[1]

Identification of the research questions

The research questions aimed to explore, describe and analyse experiences of delegating functions to insurance companies within social health protection systems. Two main questions were identified: i) which functions are delegated to mutuals/CBHI in national social health protection systems, and ii) how are decisions concerning such delegation arrived at.

In the absence of definitions of mutuals/CBHI and of the delegation of public service in international law or research, working definitions of these concepts have been adopted to delineate the parameters of this review while remaining within the exclusion criteria *stricto sensu*. In this context, the delegation of public service is defined, under French law, as "a contract by which a public or private legal entity entrusts the management of a public service falling within its competence to a delegate whose remuneration is linked to or substantially assured by the results of the operation of the service".[2] Mutuals/CBHI, for their part, are understood to be non-profit organizations of the social and solidarity

1. See www.covidence.org. This article is supplemented by an online Appendix developed by the authors (see Supporting Information) in which further details on the method can be found.
2. Article L.1411–1 of the French General Local Authorities Code.

economy characterized by their autonomy and their ethic of mutual assistance, solidarity, and the sharing of risks among their members (Atim, 1999).

Identification of the selected documents

The documents were identified in the following databases: PUBMED, EMBASE, CINAHL, PAIS International, Web of Science, Dimensions, Érudit, Isidore science, and Google scholar.[3] This strategy was complemented by research into the references of articles, and consultation with experts[4] and the websites of international organizations.

Selection of documents. The inclusion criteria covered any document: i) addressing the links between mutuals/CBHI and social protection policies; ii) presenting the roles and functions of at least one mutual/CBHI within the framework of at least one social protection policy; iii) without distinction as to the method; iv) for an unlimited period; and v) with a summary published in French or English. The exclusion criteria included: i) articles on the role of mutuals/CBHI in the context of additional and supplementary health insurance and complementary group insurance, as well as voluntary private insurance; and ii) articles in which the information about delegation was insufficiently detailed.

The study selection procedure was carried out in four stages (see Figure 1). The evaluation of the eligibility of documents was carried out in two stages: i) independent reading of the titles and summaries by two evaluators; and ii) comparison of the selection results, cross-evaluation of the 120 documents upon which agreement was not reached, and team discussions to arrive at a consensus.[5]

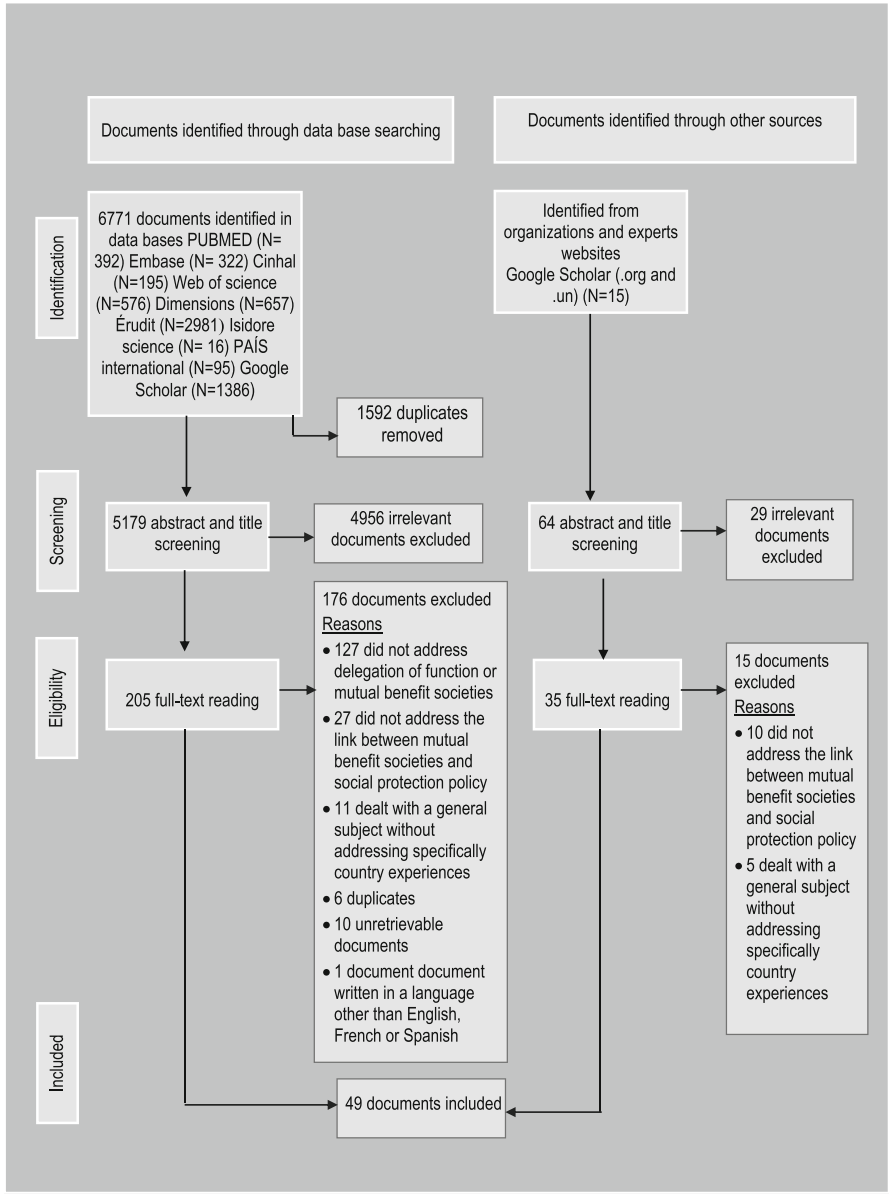
Data mapping and organization

By using the "descriptive analyses" method (Dagenais et al., 2021), the extraction and organization of data were carried out using parameters adapted to the conceptual framework of policy transfer (Dolowitz and Marsh, 2000).

1. What is meant by the term mutual/CBHI in the documents included?
2. Why are functions delegated to mutuals/CBHI?

3. This article is supplemented by an online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix, Table A1.
4. The experts are researchers and employees of national organizations (ministries of health, NGOs) and international organizations (International Labour Office).
5. This article is supplemented by an online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix, Table A1, which presents 49 documents included in this review.

Figure 1. *Diagram of the PRISMA flow for the scoping review*



Source: PRISMA, adapted by authors.

3. How are functions delegated to mutuals/CBHI?
4. What functions have been delegated to mutuals/CBHI?
5. To what extent are functions delegated to mutuals/CBHI?
6. What are the factors facilitating or restricting delegation?
7. What are the effects of delegation?

After the data extraction, a second phase of analysing and validating the preliminary results was carried out by using the main functions of social health protection systems, as derived from international social security standards (ILO, 2021a): definition of coverage parameters; awareness raising and promotion activities; registration and contribution collection; pooling of funds and risks; contracting and management of relations with health-care providers; the provision of health-care services; and participation and governance.

Results

In total, 49 relevant documents covering the period 2004–2021 were included in the review, 42 of which concerned a single country and seven of which concerned multiple countries.[6] The documents included are mainly grey literature (n=33), and 16 documents are scientific articles that use a range of methodological approaches. Table 1 summarizes the key results of the review.

What is meant by mutual/CBHI?

Some elements of the definition presented in the methods section are found in most documents: democratic governance; non-profit nature; community participation; solidarity; responsible management (Diop, Leighton and Butera, 2007; Roy and Sarkar, 2018; Soors et al., 2010). In addition, some publications refer to the federations of mutuals in accordance with the structuring of the sector at the national level (France, Morocco) (Cour des comptes, 2018, 2013).

Depending on the country, the autonomy and independent nature of mutuals/CBHI is not necessarily part of the definition, as evidenced by Ghana, Rwanda, and the United Republic of Tanzania. Similarly, the voluntary nature of membership, as well as the freedom to choose a mutual/CBHI, is sometimes mentioned, but this does not necessarily mean that membership of the social health protection system is voluntary. Several countries have mandatory registration with

6. This article is supplemented by an online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix, Table A1 (showing relevant documents covering the period 2004–2021) and Figure A1 (showing the countries included in this review).

Table 1. *Summary of the general findings from this scoping review*

Review questions	General findings
What does the term mutual/CBHI mean in the documents included?	• Absence of consensus on the definition of mutuals/CBHI. • Various uses of the term covering very different realities, particularly in terms of autonomy and voluntary membership.
Why are functions delegated to mutuals/CBHI?	• Part of a broader strategy of expanding or reforming the social health protection system and moving towards universal health coverage. • Historical process where the pre-existence or not of mutuals/CBHI largely conditions the type of role they further play within the national social health protection system.
How are functions delegated to mutuals/CBHI?	• Only a few cases of delegation would fall within the initial working definition. • In practice, there are four typical scenarios, sometimes with a continuum of change from one to another depending on the country: i Delegation contract (i.e., delegation within the initial definition): countries where there were mutuals/CBHI before the national social health protection system was developed and where these were contracted by the national body in charge of social health protection upon its creation to manage the new coverage for their members. ii Absorption: countries where mutuals/CBHI have been absorbed into the national social health protection system, including their administrative staff in some places. iii Integration: countries where the social health protection system created or structured mutual insurance companies as local public management bodies for social health protection systems. iv A final category of countries created a legal and promotional framework for the creation of independent mutual insurance companies without further contractual relationship with the national social health protection system, if any existed.
What functions have been delegated to mutuals/CBHI?	• All experiences gave mutuals/CBHI responsibilities dealing directly with front office function, i.e., the management of registration, sometimes the collection of contributions, the management of beneficiaries, local governance, administration of health-care payments in some contexts. • The situation appears to be more varied in terms of back-office functions, which tend to be centralized and seen in some countries as a prerogative and the responsibility of public bodies, in particular resources and risk pooling, decisions on coverage parameters/scheme design, and financing (including contribution rates, where applicable).
To what extent are functions delegated to mutuals/CBHI?	• Evolution and adaptation of the delegation of functions over time in accordance with the contextual realities of each country. • While some countries have opted for strong state involvement in governance through the absorption mutuals/CBHI into the national system, others retain their autonomy in operations. While in the former case there is a risk of losing the community-based and participatory character of mutuals/CBHI, in the latter case there are

(Continued)

Table 1. *Summary of the general findings from this scoping review* - Continued

Review questions	General findings
	often major challenges such as insufficient coverage and difficulties with financial viability owing to limited risk pooling.
What are the factors facilitating or restricting delegation?	• The legal and regulatory framework. • The existence of an established social health protection system. • The institutional and managerial capacities of the regulator, the delegator and mutuals/CBHIs. • Coordination with the health-care system. • Sustainability of public funding.
What are the effects of delegation?	• Contrasting effects in line with the historical conditions of the development of mutuals/CBHI and their role within the architecture of the social health protection system. • It was not possible to extract information that compared the impact of delegation of administration to mutuals/CBHI, versus the non-use of those in social health protection systems, on the reduction of financial barriers in access to care and on the provision of additional funding for health-care providers.

Source: Authors' elaboration.

the social health protection system with the free choice of a mutual/CBHI, such as in Belgium, France, and Morocco. In contrast, in Rwanda, registration with the local mutual is mandatory (Kestemont et al., 2020).

Why are functions delegated to mutuals/CBHI?

In most countries, the delegation of certain functions to mutuals/CBHI is part of a broader historical process aimed at the expansion of social health protection. The delegation of functions is sometimes part of the integration into a national social health protection system of population groups whose coverage by mutuals/CBHI preceded the creation of a national system (Belgium, France, Morocco, and Spain). In other countries, it is a matter of reforms to bring together different mechanisms to create a unified national system. In other cases, it was expected that mutuals/CBHI would make it possible to reach populations dependent on the informal economy, living in rural areas, or excluded from the social protection system (Burkina Faso, Cambodia, Senegal).

How are functions delegated to mutuals/CBHI?

The ways in which delegation is defined differ depending on whether the mutual system predated the national social health protection system. Four types of architecture can be identified, only one of which corresponds *stricto sensu* to the

working definition of delegation, and they can sometimes constitute a continuum over time.

- In contexts where certain groups were already covered by mutual insurance companies before the creation of a national social health protection system (Belgium, France, Morocco, Spain, and Uruguay), delegation took place. For example, in France, this was the result of the *Loi Morice* of 9 April 1947, which established the participation of mutual insurance companies in social security by delegating to them the management of compulsory health insurance for civil servants (Cour des comptes, 2013). In Spain, a royal decree (RD 1993/95) had established a regulation that allowed mutual societies collaborating with social security (*Mutuas Colaboradoras con la Seguridad Social – MCSS*) to collect contributions and pay benefits on behalf of the social security system (Bernal-Delgado et al., 2018). These contractual relations give rise to an agreement involving remuneration (a contribution to management costs or remuneration based on services provided to users).
- In other contexts, national health insurance organizations absorbed the mutuals/CBHI that predated the creation or reform of the national social health protection system (Cambodia, Laos, Thailand). This made it possible to affiliate the members of existing mutuals/CBHI and, in some cases, to transfer their staff. This architecture has, therefore, not yet led to management delegation agreements.
- Elsewhere, a national system has been set up and has simultaneously encouraged the creation of mutuals/CBHI or community structures for the decentralized governance of health insurance (Ethiopia, Mali, Rwanda, Senegal, United Republic of Tanzania). In this regard, two groups of countries emerge:
  - One group adopted a centralized system where the "mutuals/CBHI" are in fact public or para-public structures integrated into the institution in charge of the national social health protection system to make the system accessible by developing a network of decentralized contact points (Ghana, Rwanda, United Republic of Tanzania). In Rwanda, when mutuals/CBHI were being expanded between 2002 and 2005, local authorities were responsible for developing these at the community level (Kamwenubusa et al., 2011). This may also constitute a continuum of change where mutuals/CBHI, initially independent, have been pushed to change their status to become public or para-statal bodies for local governance integrated within the national health insurance system (Ghana).
  - The other group has put in place a legal framework allowing mutuals/CBHI to assume a certain number of functions, but in a context where the role of the State is limited to regulation (legal framework, establishment authorizations, licences) (Burkina Faso, Mali, Senegal).

In some countries, the decision to use or promote mutuals/CBHI as part of the extension of the social health protection system was taken with development

partners providing international aid (Burkina Faso, Cambodia, Ethiopia, Mali, Nigeria, Rwanda, Senegal, United Republic of Tanzania). For example, in Burkina Faso, technical and financial partners, as well as the non-governmental organizations (NGOs) supporting local mutuals/CBHI, were involved in designing the social health protection system (Kadio et al., 2018; Ouedraogo and Flessa, 2016; Conseil national de la transition, 2016).

What functions have been delegated to mutuals/CBHI in the context of social health protection systems?

The review made it possible to identify delegations or assignments of functions to mutuals/CBHI for several of the main functions of the social health protection system (ILO, 2008). It is important to note that a majority of national health insurance policies include health insurance entitlements that specify different entry points according to people's capacity to contribute and/or their employment status. There are thus contributory systems where protected persons contribute directly to the financing of the social health protection system, but where there are often subsidies for contributions where appropriate and/or exemptions from fees at the point of use for certain population groups. This diversity is reflected in the different functions that mutuals/CBHI can have (ILO, 2021b).

Definition of coverage parameters. In most cases, the parameters (benefit package, reimbursement rates and methods, contribution rate, if applicable) are defined centrally by the Government. This is therefore imposed on the mutuals/CBHI within the management delegation framework, sometimes with a certain level of participation of the mutuals/CBHI to which functions are being delegated (Ethiopia, France, Ghana, Japan, Mali, Rwanda, as well as Senegal within the framework of its departmental health insurance unit[7]). In Ghana, although the State imposed a minimum benefits package, mutuals/CBHI at the district level could define their package that would be approved by the National Health Insurance Authority (Boon, 2007). In Belgium, the tariffs and reimbursement levels for the base cover are defined through national conventions with the participation of health-care providers and representatives of mutuals/CBHI (known as *caisses de maladie*) (Gerkens and Merkur, 2020).

Awareness raising and promotion activities. In several countries (Burkina Faso, Ethiopia, France, Mali, Nigeria, Rwanda, Senegal), mutuals/CBHI conducted

7. *Unité départementale d'assurance maladie* (UDAM).

training and awareness-raising campaigns for target communities, community leaders, and political decision makers on mutuals/CBHI. In Burkina Faso, the tasks of sensitizing, mobilizing, and raising the awareness of target communities were also delegated to mutuals/CBHI or through a support network for mutual health organizations (*Réseau d'appui aux mutuelles de santé* – RAMS) (Kadio et al., 2018; Ouedraogo and Flessa, 2016; Conseil national de la transition, 2016).

In some countries, mutuals/CBHI have played a role in promotion and prevention. In France, this has taken the form of health education and increasing patient involvement with the health-care authorities (Cour des comptes, 2003), activities to combat smoking or obesity, or prevention activities (Caire, 2009).

Registration and contribution collection. Mutuals/CBHI can be assigned roles in the registration and identification of populations and in the collection of social contributions (when applicable).

In some cases, mutuals/CBHI identified poor or vulnerable households (Burkina Faso, Ethiopia, Rwanda, Senegal, United Republic of Tanzania). For example, in Senegal, under a process aimed at the decentralization of health insurance (*Décentralisation de l'assurance maladie* – DECAM), mutuals collaborated with the leaders of community-based organizations, neighbourhood and village chiefs, and local government officials to identify low-income people eligible for non-contributory membership (Ouattara and Ndiaye, 2017). In the United Republic of Tanzania, a district-level community health fund coordinator was responsible for monitoring subsidized membership, utilizing funds and reporting on the Health Solidarity Fund (Borghi et al., 2013).

In contributory schemes, two scenarios have been identified. In the first scenario, mutuals/CBHI are responsible for collecting contributions from their members (Cambodia, Ethiopia, Ghana, Rwanda). For example, in countries where health insurance was compulsory, such as Ethiopia (ILO, 2021c) and Rwanda (Kamwenubusa et al., 2011; Ouedraogo and Flessa, 2016), the committee at the level of the cell or the section was responsible for collecting and managing contributions. However, when health insurance was not compulsory (Burkina Faso, Mali, Senegal), the task of collecting contributions could be difficult for mutuals/CBHI. This calls into question the idea that mutuals/CBHI provide additional or "self-financed" resources for expanding social health insurance. In the other scenario, another centralized body handles contribution collection rather than the mutuals/CBHI. For example, in France, a social security and family allowance collection network (*Union de recouvrement des cotisations de sécurité sociale et d'allocations familiales* – URSSAF) is responsible for collecting social security contributions and distributing them to the various social protection

institutions, including the National Sickness Insurance Fund (*Caisse nationale de l'assurance maladie* – CNAM), which pays the mutuals/CBHI that have been tasked with managing the benefits (Chevreul et al., 2015).

Pooling of funds and risks. Although risk sharing and solidarity are values attributed to mutuals/CBHI, the degree to which funds and risks are pooled is poorly documented. In some countries, mutuals/CBHI seemed to have been the body responsible for pooling, while in others, this process was carried out either by a national body or at a sub-national level, with the pooled funds being returned to the mutuals/CBHI. The pooling of several funding sources creates solidarity within a broader risk-sharing scheme. In addition, it allows the cross-subsidization of health-care structures in different locations. For example, in Rwanda, the national guarantee fund for mutuals/CBHI (*Fonds national de garantie des mutuelles de santé* – FNGM)[8] subsidized an amount equal to the contribution made by the insured persons (Diop, Leighton and Butera, 2007; Kamwenubusa et al., 2011). In Colombia, funds for the care of poor and vulnerable groups were transferred to mutual associations federated into a national institution (Coheur et al., 2007). In the United Republic of Tanzania, funds were pooled at the district level through Cost Sharing and Insurance Funds (CSIFs) to enable cross-subsidization between health centres (Borghi et al., 2013; Soors et al., 2010). In Senegal, within the framework of the UDAM, the local mutual insurance company is responsible for the risk pooling for primary care, while the departmental union takes on risk pooling for hospitalization (Ouattara and Ndiaye, 2017).

Contracting and the management of relations with health-care providers. In the identified experiences, contracting with health-care providers was frequently delegated. They can have the following functions:

• Manage the signing of contractual agreements with health-care service providers and their follow-up (Belgium, Burkina Faso, Ethiopia, Mali, Nigeria, Rwanda, United Republic of Tanzania) either independently (Mali, Senegal) or as part of a national process agreed with the Government (Belgium, Rwanda). In Rwanda, in collaboration with the technical support unit for health mutuals (*Cellule technique d'appui aux mutuelles de santé* – CTAMS), the district mutual provided technical assistance to the mutual insurance sections, including training for the management and the supervision of contractual relations with health-care centres (Diop, Leighton and Butera, 2007).

8. Mobilizing partner funds, private health insurance in the country, the government and health-care establishments.

• Purchase health-care services (in most of the experiences identified). The benefit payment methods are diverse, and it is not possible to determine whether it is the mutuals/CBHI that make decisions on the method or whether these are decisions taken within the framework of the general functioning of the social health protection system. The studies mention, among other things, that in Rwanda, some mutuals/CBHI paid providers a monthly prospective capitation rate, while others paid providers on a fee-for-service basis (Diop, Leighton and Butera, 2007).

And more rarely:

• Negotiate rates with health-care providers (Ghana, Senegal).
• Monitor service use by collecting data and writing reports (Rwanda).

Some publications mention the use of third-party payments by mutuals/CBHI to facilitate access to care for users without any advance payment on their part (Belgium, Cambodia, Ethiopia, France, Spain), sometimes within the framework of broader health insurance policies at the national level (France).

Provision of health-care services. In some countries, mainly in Latin America, mutuals/CBHI played the role of health-care provider as they had their own health-care facilities (Colombia, Uruguay). Before the introduction of compulsory health insurance in Morocco, some mutuals/CBHI had both an insurance and a health-care provider role (European Economic and Social Committee, 2013). Within the legal framework for the adoption of compulsory health insurance, the functions of the compulsory health insurance manager and the care provider for compulsory health insurance beneficiaries were separated. The concerned mutuals had to create separate entities; some focused on the delegated management of compulsory health insurance, and others, which could be contracted within this framework, were in charge of the management of health-care facilities (Conseil économique, social et environnemental, 2018; Cour des comptes, 2018).[9]

Participation and governance. Community participation, through social mobilization and the commitment of the mutuals/CBHI beneficiaries to a more democratic management of the social health protection system, was only rarely addressed in the documents listed. In several countries (Burkina Faso, Ethiopia, Ghana, Nigeria, Rwanda, Senegal, United Republic of Tanzania), communities were involved in decision making in the following areas:

9. For example, the Mutuelle des unités sanitaires des fonctionnaires et agents assimilés du Maroc, the Mutuelle des oeuvres sociales et sanitaires du personnel de l'office d'exploitation des ports and the Mutuelle des actions sanitaires et sociales des forces auxiliaire.

contracting and negotiating with health-care providers; the provider payment system; registration management; the collection and management of contributions; and the management of beneficiary information.

In Nigeria, the programme managers of community-based mutuals/CBHI were responsible for helping the new participating communities set up boards of directors and for carrying out capacity-building activities (National Health Insurance Scheme, 2012).

In countries where there is no delegation of management, in the sense of the working definition, because the mutuals/CBHI are not independent entities or have been absorbed into the national system, their governance was based on consultation and community management. In Ghana, it was the National Health Insurance Authority (NHIA), responsible for the management of the National Health Insurance Scheme (NHIS) at the central level, that licensed and regulated district mutual health insurance schemes (DMHIS). The State had a significant role in the governance of these mutuals, appointing board members (Boon, 2007). In Rwanda, district and sectional mutuals/CBHI were managed at the national level by the Rwanda Social Security Board (RSSB). The State appointed the members of the board of directors by ministerial order (Kestemont et al., 2020).

Furthermore, in some countries, mutuals/CBHI could compete with private insurance companies to win management-delegation agreements with public social protection institutions (Colombia) (Coheur et al., 2007). However, these trends often have a negative impact on the capacity of non-profit organizations to play socially transformative roles in engaging and empowering their target groups and defending their rights, possibly linked to a move away from their original values and missions (Almog-Bar and Schmid, 2014; Alexander and Fernandez, 2021).

To what extent are functions delegated to mutuals/CBHI?

Analysis of the documents makes it possible to identify a typology as follows:

- **Countries where mutuals/CBHI have a high degree of independence and where there is no delegation of health insurance management in the sense of the working definition.** For these, there is an allocation of a certain role or functions to the mutuals/CBHI, alongside state intervention, which is limited to regulation and sometimes fostering the creation of insurance companies. In this case, they have all the functions of a health insurer. However, this significant level of autonomy often results in difficulties in operating and achieving a minimum level of coverage to ensure viability (initial situation in Burkina Faso, Mali, Senegal).
- **Countries where mutuals/CBHI have a delegation to administer compulsory health insurance.** These have less autonomy, limited delegated

functions, and a tight framework but have relative long-term stability (Belgium, France, Uruguay).

• **Countries where the mutuals/CBHI are public or para-public entities dependent on the national system, either since their creation** (Rwanda, United Republic of Tanzania) **or since being absorbed at the time of the creation or reform of a national system** (Cambodia, Ghana, Laos, Thailand). For these, there is no degree of delegation as such, but rather a distribution of roles between the centralized level (generally ensuring back-office functions) and the decentralized level (generally in charge of direct service delivery and local governance functions).

The experiences listed are at different stages of implementation and are liable to change significantly over time, making it challenging to offer a lasting categorization within this typology. Changes occur during the scaling up or institutionalization of the social health protection system (Ghana, Rwanda) or through the repositioning of actors over time (France). For example, in Mali, to implement universal health insurance by 2023, a process to restructure community-based mutuals/CBHI into communal mutuals/CBHI was set in motion (Ouattara and Ndiaye, 2017). In Senegal, while two different approaches were being tested (DECAM and UDAM), the State has recently decided to dissolve the communal mutuals/CBHI and reallocate the departmental units to the national level. Furthermore, the involvement of mutuals/CBHI in social protection systems is more complex than the management delegation framework mentioned in the introduction from both a historical and operational point of view.

What are the factors facilitating or restricting delegation?

Regulatory framework. The standardization of the organizational structures and financial management of mutuals/CBHI was found to have facilitated the process of their integration into the social health protection system, especially in the scaling-up process that has taken place in Ghana (Baltussen et al., 2006) and Rwanda (Chemouni, 2018).

Contractual framework and agreement. Although the clarity of the contractual framework (including the definition of delegation and the expected objectives) has been identified as a critical factor in its success, few documents address the practicalities.

In countries where mutuals/CBHI were conceived as decentralized, non-independent management structures, the centralized governance of the social health protection system was a means of better structuring delegation and the roles of each actor, as in Ghana, Rwanda (Kestemont et al., 2020) and the

United Republic of Tanzania (Borghi et al., 2013). In these countries, it has also been observed that social acceptance of decentralization and the community approach and political ownership of the delegation process have been fundamental, particularly in Ghana (Adomah-Afari and Chandler, 2018; Kestemont et al., 2020). In addition, the centralization of the risk pool at the national level has promoted better risk sharing (Kestemont et al., 2020).

Institutional and management capacities. In a dynamic of scaling up, the poor monitoring and auditing capacities of the authorities supervising and regulating mutuals/CBHI can create significant dysfunctions in the delegation. For example, in Cambodia, the Ministry of Health could not implement controls or monitor the results of the mutuals/CBHI (Annear et al., 2013).

In many countries, the State has set up national agencies in charge of social health protection systems that are responsible for the relationship with contracted mutuals/CBHI, for example, the National Agency for Universal Health Coverage (*Agence nationale de la couverture maladie universelle*) in Senegal, the National Sickness Insurance Fund (*Caisse nationale d'assurance maladie – CNAM*) in France or the Tanzanian National Health Insurance Fund (TNHIF) in the United Republic of Tanzania. The institutional and management capacities within these public bodies responsible for social health protection systems' mutuals/CBHI are identified as important factors. For example, in Senegal, mutuals/CBHI had weak operational capacities, which often resulted in dysfunctional agreements with health-care facilities, reviews of invoices, payments to facilities, and a lack of remuneration of their own employees (Daff et al., 2020; Kestemont et al., 2020). The national agency in charge of universal health coverage did not initially play a role in bearing and pooling risk at a national level, resulting in the delegation of this function to many mutuals/CBHI, none of which were necessarily professionalized, which led to significant fragmentation and little solidarity at the national level (Daff et al., 2020; Kestemont et al., 2020). The professionalization of mutuals/CBHI would appear to be a prerequisite for improving their efficiency as delegators (Rouyard et al., 2022) and for their upscaling (France, Belgium, Nigeria, Rwanda) (Boidin, 2021).

Coordination with the health-care system. The availability of the products and services included in the benefits package at the health-care facility level is essential to guaranteeing continuity and community confidence in the functions of mutuals/CBHI (Ouedraogo and Flessa, 2016). Difficulties in the functioning of health-care facilities, in terms of insufficient inputs or human resources, constitutes a considerable limitation to the proper functioning of delegation (Raheem et al., 2019).

The involvement of regional and district health officials and local authorities in raising the awareness of local communities should facilitate a better understanding of the roles of each actor in social protection and the community-based management of mutuals/CBHI. For example, in the United Republic of Tanzania, the district health committee, the health-care facility management committee, and health-care workers were responsible for encouraging membership of the community health fund and informing the community of the funds collected and how they are used within health-care facilities (Borghi et al., 2013). In some contexts, service providers and communities may have little understanding of the system and the functions delegated to mutuals/CBHI, as they are often not involved in delegation processes. This has been identified as a barrier to community buy-in and involvement (Boon, 2007) and as a disincentive to the use of health services by beneficiaries (Kadio et al., 2018).

Sustainable public financing. A lack of public funding for social health protection systems has often threatened the sustainability of delegation. Indeed, in several countries, the delegation of management to mutuals/CBHI was accompanied by public subsidies (participation in operating costs, subsidies for all or part of the contributions). In such a context, insufficient government funding and/or delays in disbursement have been a significant challenge in the implementation of the delegation of functions to mutuals/CBHI in Cambodia (Annear et al., 2013), Thailand (WHO, 2004) and the United Republic of Tanzania (Borghi et al., 2013).

Furthermore, in some lower-income countries, the transformation of the social health protection system and/or the development of mutuals/CBHI is often financed and supported technically by international donors. To fulfil their functions, mutual insurance companies mutuals/CBHI often depended on external, non-sustainable funding to fulfil their functions. In Ethiopia, for example, USAID funding enabled to increase membership and contribution collection rates, something which could not be sustained after this financial support ended (Kestemont et al., 2020).

When the collection of contributions from members is delegated to mutuals/CBHI and when the social health protection system is not compulsory or the financing arrangements (contribution rates, lack of subsidies) are not adapted, the performance of this collection function remains a significant challenge. Indeed, poor people often find it difficult to pay their contributions, a category in which workers in the informal economy are disproportionately represented (Boon, 2007; Diop, Leighton and Butera, 2007; Soors et al., 2010). For example, in Mali, the evaluation of the pilot phase of the national strategy for the extension of coverage (*Stratégie nationale d'extension de la couverture maladie – SNEM*) through mutuals/CBHI in 2015 revealed a low level of state

subsidies which had managed to mobilize only 19 per cent of the effective subsidy rates and that was accompanied by a low rate of penetration (Ouattara and Ndiaye, 2017). In contrast, in the United Republic of Tanzania, the allocation of a subsidy equal to membership fees by the Government was found to be an effective incentive for people to enrol over the long term (Soors et al., 2010).

What are the effects of delegation?

When the delegation of functions was introduced as part of the creation of a national social health protection system that sought to include pre-existing mutuals/CBHI, it made it possible to extend national coverage by integrating the members of mutuals/CBHI into a broader risk pooling system (Cambodia, France, Japan, Laos, Thailand, Uruguay).

Where the national system was created with the intention of developing mutuals/CBHI into local and participatory management mechanisms, experiences vary greatly. In Ghana, Rwanda, and the United Republic of Tanzania, a relatively centralized approach with little autonomy for community-based mechanisms has resulted in broad coverage and financial sustainability, while the professionalization of these structures has also created a less participatory structure (Chemouni, 2016; Kestemont et al., 2020). Similarly, the agreement of public service contracts with mutuals/CBHI or their absorption into national social health protection programmes has had the effect of increasing the number of community-based organizations and transforming small mutuals/CBHI into district- or department-wide entities (Adomah-Afari and Chandler, 2018; Borghi et al., 2013). Moreover, this process may have occurred alongside professionalization (Kestemont et al., 2020).

Discussion

The discussion of the results of this review is organized into six themes in which we highlight the salient observations arising from the country experiences in reviewed documents. In turn, the issues and challenges posed by the delegation of functions are also discussed to identify lessons learned from existing experiences.

Conceptual framework

The scoping review revealed a lack of conceptual clarity on the terminology used, owing to the lack of a consensus on definitions. Mutuals/CBHI are defined in different ways. This reflects a more general diversity within the social and solidarity economy, where definitions differ according to national contexts as

well as the legal framework (ILO, 2022). The lack of a clear definition and legal status can be an obstacle to the delegation of public services. At the same time, some countries have used the term "mutual" to designate decentralized public administration bodies.

Similarly, the concept of delegation is rarely used in the documents evaluated, and when it is, it is not necessarily defined as strictly as in our working definition. Little information was found on the details of the provisions of agreements between public authorities and mutuals/CBHI. This may indicate three potentially concurrent phenomena. First, the review found that in several countries the institutions in charge of the social health protection system were non-existent, in the process of being created or had little capacity. This situation could result in a division of functions with mutuals/CBHI or institutional encouragement for their creation, rather than an actual contracting process based on a clear delegation of management. Second, in other countries, the mutuals/CBHI were, in fact, state-dependent bodies with participatory governance. As such, there was no delegation in the strict sense (with the signature of a delegation agreement) as the bodies belonged to the public entity, so the arrangement did not give rise to an agreement. In a third scenario, there is an agreement, but this process did not seem to have been studied using comparative analyses that would make it possible to identify good or bad practices.

A historical process in constant evolution

The scoping review highlighted that the decision by governments in some countries to delegate certain functions relating to the implementation of social health protection systems to mutuals/CBHI is based on historical processes rather than on cost-benefit assessments of these mechanisms. Also, delegation is not systematically followed by evidence-based evaluations. In addition, little information or research has been identified on the benefits of contracting mutuals/CBHI as opposed to other mechanisms, such as direct government management. Moreover, this historical process is dynamic, and the role of mutuals/CBHI with delegated functions has evolved over time. Three types of historic "starting points" can be identified:

- In some countries, mutuals/CBHI for health and social protection were created to compensate for the absence of a national social protection system. As a result, when the system was created or expanded, the mutuals/CBHI were contracted as management delegates for the groups they already covered (France, Morocco, Uruguay) or absorbed by a new public institution to put an end to their fragmentation and to pool risks on a larger scale (Laos, Thailand), and in some cases, both processes occurred.

- When the national system is incipient or non-existent, the mutuals/CBHI can be recognized as actors in the social protection system, even when their scope remains limited. In such instance, they tend to provide all the insurance functions without any agreement with the public authorities and encounter difficulties in viability linked to a lack of funding, weak management, and limited risk pooling.
- In other countries, mutuals/CBHI were conceived as community management mechanisms of the national social health protection system at the time of its creation or reform, so the delegation of functions did not necessarily go through an agreement process, and in some cases, these mutuals/CBHI are not or are no longer independent entities (Ghana, Rwanda, United Republic of Tanzania).

Furthermore, the models adopted by some countries seem to have been taken up and adapted by others. The dissemination and scaling-up processes should be considered further in subsequent studies (Niang, 2022; Seppey, Ridde and Somé, 2020). While village-based mutuals/CBHI were struggling to develop in Senegal, Criel (1998) had already proposed the creation of district-level mutuals/CBHI and suggested scaling them up gradually. However, in a context where development actors tend to export ideas, it would be essential to understand these processes (Gautier et al., 2019). For example, the Rwandan model is frequently cited as a source of inspiration. However, Rwanda's specific political and social context may limit the transferability of public policy models (Ridde et al., 2018).

Delegation requires a well-developed health insurance architecture and strong institutions

The delegation of functions has to be part of a broader architecture of the national social health protection system and the health and social protection system, more generally, with strong public institutions. Deficits at this level affect the attractiveness, feasibility and effectiveness of delegation. This architecture requires adopting equitable and sustainable health financing, social protection governance mechanisms, and well-defined social health protection coverage parameters. For example, in Burkina Faso, although universal health insurance was launched in 2000, at the time of the study included in this review, it had not been put into operation, and there was, therefore, no operational framework for the delegation of roles and functions to mutuals/CBHI (Ouedraogo and Flessa, 2016). International social protection standards can guide the development of a robust social health protection architecture and the choice of appropriate coverage parameters (ILO, 2020).

Mutuals/CBHI are not a substitute for the sustainable financing of social health protection systems

In the countries studied, the delegation of functions is a management tool at the disposal of the public authorities, which requires remuneration or financing. In this sense, the idea that mutuals/CBHI would be a tool for generating funding for social health protection systems in a self-sufficient way does not seem to have been verified, especially when social health protection is not compulsory; the penetration rates of mutuals/CBHI are low, and contribution levels are ill-adapted without the participation of employers or the State.

In several lower-income countries, it has been noted that the delegation of functions to mutuals/CBHI is funded through international donors who often guide the structure of delegation and governance mechanisms (Ridde et al., 2022; Verbrugge, Ajuaye and Van Ongevalle, 2018). However, the lack of coordination between the various donors involved in health and social protection agencies is an important challenge in ensuring the sustainability of the delegation of functions to mutuals/CBHI. In Cambodia, for example, CBHI set up through a project has ceased to exist following the end of the project (Kolesar et al., 2020).

The selection of functions to delegate

Some functions seem to be delegated more than others or with greater success. Experiences show that responsibilities related to delivery are more often delegated, i.e., the management of registration, sometimes the collection of contributions, the management of beneficiaries, local governance, and the management of reimbursements/payments to health-care providers. In contrast, the situations seem to be more varied for decision-making functions concerning the parameters of coverage, the pooling of resources, risk sharing, financing (including contribution rates, if applicable), and relations with health-care providers at the national level (contracting, tariff negotiations). In several countries, these functions are centralized and seen as the prerogative and duty of public bodies.

Community mobilization and participation

The professionalization and centralization of certain resources and management practices, although identified as factors in the success of the delegation of management to community structures, sometimes seem to harm the community and participatory dimensions. Community participation in governance has decreased over time in countries with a long tradition of delegating functions to

mutuals/CBHI or having eventually absorbed them (Cambodia, France, Japan, Laos, Rwanda, Thailand, Uruguay). Furthermore, although the participatory structure of mutuals/CBHI is identified as an advantage of the delegation that can, in theory, lead to confidence in the social protection system and create a local democratic base, in practice, the function of social mobilization and the organization of participation does not seem to have been identified within the delegation frameworks. The impact of delegation on these aspects is not well documented either. This paradox is one of the areas for future research that has emerged from the scoping review.

Conclusion

This review has made it possible to identify publications on the delegation of functions to mutuals/CBHI in the social health protection systems of 18 countries. For several reasons, obtaining a general worldwide overview of all lived experiences was challenging. First, this subject has been little studied. Moreover, no internationally agreed definition of mutuals/CBHI or of the delegation of management or functions exists. A second challenge encountered is the dynamic nature of the experiences of delegating functions to mutuals/CBHI. It was not easy to conduct a comparative inter-country analysis, especially as comparative assessments are rare and causal challenges are significant. Some countries' experiences were not current at the time of the review, and more recent innovations had not yet been published. Regardless, the results obtained make it possible to establish a set of findings and lessons that can be used to advance knowledge on this subject, which can be used both in research and practice.

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Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Argentina's Emergency Family Income (IFE): An opportunity for women's empowerment

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Abstract This article provides empirical evidence regarding the impact of the Emergency Family Income (*Ingreso Familiar de Emergencia* – IFE), which was implemented in Argentina in 2020. Investigated is the impact of the IFE on women's role in providing household income and on the distribution of roles within households, as a reflection of women's empowerment. Drawing on various household surveys, the study compared those women eligible to receive the transfer with those who were not. A difference-in-differences (DID) methodology was used to measure the impact. Following the implementation of the IFE, women's share of couple income and household income is found to have increased by some 8 per cent and 11 per cent, respectively, while the probability of women being solely responsible for household chores has fallen by 4 per cent.

Keywords cash benefit, women's empowerment, women, COVID–19, Argentina

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Introduction

The mandatory lockdown that resulted from the COVID-19 pandemic exposed existing inequalities in society and deepened problems such as income disparities and high levels of poverty and destitution that characterize the Latin American region. In this context, Latin America's governments rolled out a number of different social protection measures. The Brazilian Government, for example, granted relief to the sum of 600 Brazilian reais (BRL) (equivalent to 102 US dollars (USD)) per month for three months to adults not in formal employment, as well as to micro-entrepreneurs. The Plurinational State of Bolivia made a one-off supplementary payment of 500 bolivianos (BOB) (USD 72) to *Bono Familia* (Family bonus programme) beneficiaries and advanced the annual bonus to *Renta Dignidad* (Non-contributory pension programme) beneficiaries. For its part, Colombia paid an additional allowance to families benefitting from its *Jóvenes en Acción* (Youth in action programme), Familias en Acción (Families in action programme) and *Adulto Mayor* (Seniors' programmes). Uruguay doubled the food vouchers provided via the *Uruguay Social* programme – a monetary transfer intended to cover the purchase of food and personal hygiene products – as well as doubling the value of transfers to *Asignaciones Familiares* (Family allowances) and *Plan Equidad* (Equity programme) beneficiaries.[1] These measures were aimed at safeguarding public health; ensuring the well-being of households, especially those most vulnerable; upholding production capacity; and creating the conditions for a resumption of economic activity (ECLAC, 2021).

Argentina adapted its existing social programmes at the same time as putting in place a series of policies intended to mitigate the effects of the COVID–19 pandemic. Notable were the special payments made to social security beneficiaries (such as lower-income pensioners and recipients of the *Asignación Universal por Hija o Hijo* (Universal Child Allowance – AUH) and *Asignación por embaraso* (Pregnancy allowance – UAE).[2] Among the new measures, the *Ingreso Familiar de Emergencia* (Emergency Family Income – IFE), a short-term but broad measure reaching the most vulnerable social groups, stands out. This emergency programme, born of Decree 310/2020 of 24 March 2020, consisted of a monetary payment of 10,000 Argentine pesos (ARS) (approximately USD 145) per month (paid for a total of three instalments) to the most disadvantaged families. For the three payments combined, 8.9 million people

1. See cepal.org web portal: COVID-19 Observatory in Latin America and the Caribbean: Economic and social impact.
2. See Decree 481/2021 and Decree 261/2021 (In Spanish).

benefitted at a cost of ARS 230,600 million, equivalent to 0.9 per cent of GDP (ANSES, 2020).[3]

A number of studies have explored, from an economic and social perspective, the various impacts of the period of COVID–19 lockdown and some of the related measures taken. Bonavida Foschiatti and Gasparini (2020), for example, look at the impact on family income, with a focus on inequalities resulting from an asymmetry in the possibility of working remotely. They also assess households' status in terms of poverty and destitution, finding that the full implementation of the IFE and the granting of other allowances reduced losses in the income share of households in the lowest income deciles while also helping to lessen any increase in inequality. Similarly, they find that rates of poverty and destitution increased by 2 percentage points (p.p.) and 1.1 p.p., respectively, in the absence of such measures. In line with these figures, Díaz Langou et al. (2020) find that without the IFE, and without the other measures aimed at supporting those employers and/or self-employed workers not benefitting from the programme, the poverty rate would likely have increased by a further 2.6 p.p., affecting 43.5 per cent of the population. As such, the authors estimate that these policies have prevented 1.2 million people from falling below the poverty line.

For its part, the Argentinian Government has published, on its official website, a Ministry of Economy (*Ministerio de Economía*) study undertaken in conjunction with the Ministry of Productive Development (*Ministerio de Desarrollo Productivo*) and the Ministry of Labour, Employment and Social Security (*Ministerio de Trabajo, Empleo, y Seguridad Social*), which estimates that the initial IFE payment, made during the course of April and May 2020, avoided a rise in poverty of between 5–7 p.p., and a 4–7 p.p. increase in destitution. The same study also suggests that this payment enabled the State to broaden social security coverage to households not benefitting from measures such as the AUH and AUE family allowances or the food card (*Tarjeta Alimentar*) (Argentina Presidencia, 2020).

Furthermore, the IFE may have had other relevant spill over effects that have been little explored, yet deserve attention – for example, relating to gender issues. Indeed, economic and social crises impact men and women unequally owing to the different ways in which they engage in the economy. Although most of these studies highlight the progress that has been made in this regard, inequality between men and women remains a structural characteristic of Latin America. Not only do women continue to bear the brunt of both paid and unpaid care

3. In April 2020, the Chilean Government announced a similar measure that would reach 4.5 million people in 60 per cent of the country's lowest-income households, who rely on informal employment as their primary source of income. See cepal.org web portal: COVID-19 Observatory in Latin America and the Caribbean: Economic and social impact.

work, but recent crises such as the COVID-19 pandemic and the effects of the conflict in Ukraine are reversing the progress made in closing gender gaps (UN Women, 2020, 2021). Marchionni, Gasparini and Edo (2019) find that, despite progress in the region, women account for just four in ten workers, and that working women work on average eight hours less than their male counterparts. This labour market gap is also reflected in wages. A woman's salary is, on average, 11 per cent lower than that of a man, but this gap rises to 22 per cent when comparing workers with similar characteristics.

In Argentina, as stated by Brosio, Díaz Langou and Rapetti (2018), although women's participation in the labour market has increased over recent decades, it remains 27 p.p. lower than that of men. Lombardía, Garriga and Minoldo (2021) demonstrate that women are more prone to precarious employment and concentrated in branches of activity characterized by low wages and fragile working conditions. Trombetta and Cabezón Cruz (2020) identify a gender pay gap of between 11 and 12 per cent, while Paz (2018) notes that men have a 13.2 per cent salary advantage.

Women still devote a much greater proportion of their time to housework and care duties than do men, and this divide is even more pronounced in households with children. Figures show that women in Argentina carry out more than 75 per cent of unpaid housework. Overall, 88.9 per cent of women undertake these tasks and spend an average of 6.4 hours per day on them. Meanwhile, only 57.9 per cent of men undertake these tasks, at an average of 3.4 hours per day (D'Alessandro et al., 2020a). Moreover, Paz and Arévalo (2020) find that, from 2012 onwards, there has been a greater prevalence of poverty in female-headed households than in male-headed households, reflecting women's greater vulnerability. Given this context of clear inequality, it is interesting to examine to what extent the IFE has served as a tool for women's empowerment.

Women's empowerment is a term encompassing a wide range of dimensions, both individual and collective. In addition to economic and labour aspects, it also includes aspects relating to politics, health (including fertility), education, and violence (such as sexual or religious violence), among others.[4] Without losing sight of the complexity of the concept, this study will focus on just some of these issues. Thus, this article aims to provide empirical evidence regarding the IFE's impact on female-headed households (both in terms of self-perception and economics) and the distribution of roles within households, considering these dimensions to be a reflection of women's empowerment. As such, this study's primary contribution is to strengthen the body of empirical literature,

4. For a theoretical overview of the concept of women's empowerment, see Vera-Tudela Traverso (2010, chapter 2).

since this is the first study to address the quantitative impact of an emergency income transfer policy such as the IFE on aspects of women's empowerment.

Having women in the role of head of household is being reinterpreted as empowering for women (Liu, Esteve and Treviño, 2017; Chant, 2008; Datta and McIlwaine, 2000). Indeed, the term "head of household" normally refers to the person who makes the decisions. In this way, being "head" goes hand in hand with an enhanced capacity for taking action. Power also comes from economic leadership; in other words, women's ability to access and dispose of resources. However, the economic empowerment conferred by income transfers does not necessarily equate to women's empowerment in a broader sense. While we have certainly seen an increase in the number of female heads of household, the link with share of household income has weakened over time (Marchionni, Gasparini and Edo, 2019). Given how the two concepts differ in behaviour, we examine, on the one hand, the potential effects of the programme on women's position as the head of households, and, on the other hand, on changes in women's share of household income.

It is also possible that the IFE has significantly altered women's behaviour in their households, with potential repercussions in terms of their empowerment and intra-household bargaining power. Amarante and Vigorito (2012) suggest that, as shown by collective decision-making models, the transfer of money to a given household member can increase that individual's decision-making capacity within his or her household. In particular, evidence shows that income transfers that change the relative positions of women and men within the household affect family decisions concerning investments in education, health and nutrition.[5] It therefore stands to reason that changes in household management, as a result of higher incomes, reveal women's increased power.

Likewise, we consider changes in the probability of women being solely responsible for household chores and of sharing these with others (either family members or people outside the household).

The remainder of this article is structured as follows. The next section provides a brief description of the IFE and its characteristics. In turn, we set out the data, the methodology and present our findings. Our conclusions are then presented.

Characteristics of Argentina's Emergency Family Income (IFE)

The IFE came about as a temporary measure in response to the COVID–19 pandemic with a view to compensating families – especially those most vulnerable – for lost income. The programme, created by Decree 310/2020 of

5. See, for instance, Duflo (2012) for a review of several empirical studies.

24 March 2020, comprised a one-off, non-contributory cash payment of ARS 10,000 (approx. USD 145) aimed at unemployed people or those in informal employment aged 18–64. This measure also included domestic workers in private homes, single-tax contributors (*monotributistas*) eligible for the "social" rate and those in income categories A and B.[6] To be eligible, beneficiaries could not belong to a family group in which one member was in receipt of unemployment benefit, an old-age pension or some other social security benefit, an employee in formal employment, a single-tax contributor in category C or above, or self-employed. The benefit was paid in three instalments. The first instalment was provided in April/May 2020, the second in June/July, and the third in August/September.

While the measure was a response to the economic context provoked by the compulsory lockdown imposed in March 2020,[7] it highlighted a number of structural problems. The economic fragility of self-employed, unemployed, informal and domestic workers extends beyond the context of the pandemic (D'Alessandro et al., 2020b). According to *Encuesta Permanente de Hogares* (Permanent Household Survey – EPH) data, this broad group represents 26.0 per cent of the economically active population (EAP), and 58.8 per cent of its members live at the poverty line. Figure 1 shows the sex and age distribution of IFE beneficiaries in July 2020.

If we disaggregate IFE beneficiaries by employment status (Figure 2), 61.7 per cent are informal or unemployed workers without unemployment insurance, 27.0 per cent are AUH/AUE beneficiaries, 7.8 per cent are single-tax contributors, 2.1 per cent are domestic workers, and 1.4 per cent are beneficiaries of the PROG.R.ES.AR plan[8] (ANSES, 2020).

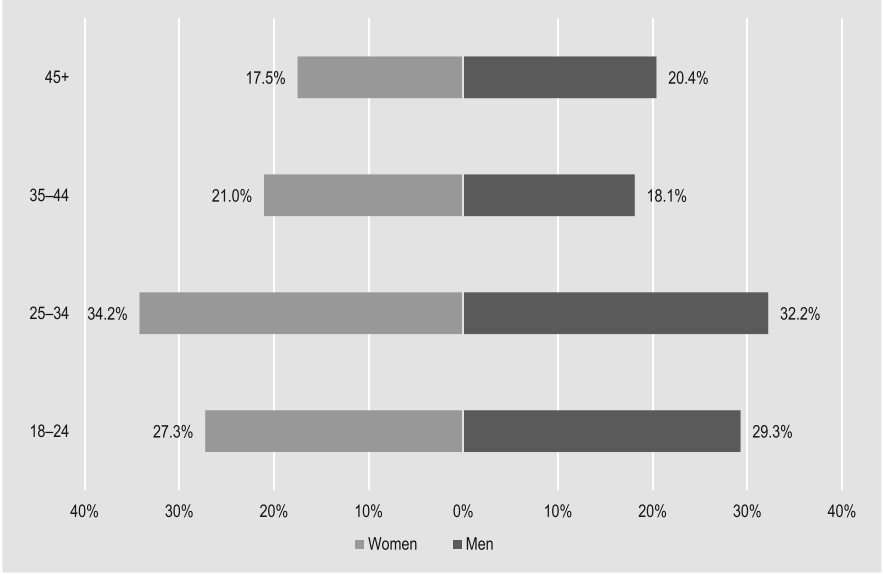
The proportion of IFE beneficiaries in relation to the total number aged 18–64 in the population also varies by region. The regions of northern Argentina, whose social indicators show a greater number of people living in conditions of

6. The *monotributo* is a simplified contributory regime for low-income contributors. It consists of a monthly payment (covering tax and social security) that is based on the worker's gross annual turnover. Categories A and B are the lowest categories on the income scale (the categories can be consulted at www.afip.gob.ar/monotributo/categorias.asp). For its part, the *monotributo social* scheme is open to those workers whose gross income is less than that of the aforementioned category A, and who meet certain set criteria (for further information, see www.anses.gob.ar/monotributo-social).

7. See Decree 297/2020, published in the *Boletín Oficial de la República Argentina* on 19 March 2020.

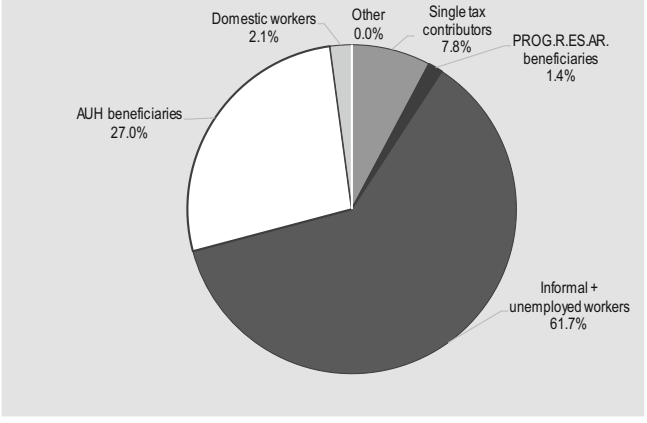
8. PROG.R.ES.AR. is a programme aimed at young people aged 18–24 who are either unemployed or in informal employment and whose household income does not exceed three times the minimum living wage (*Salario Mínimo, Vital y Móvil*). The programme was launched in January 2014 by Decree 84/2014 with a view to enabling young people to complete their primary, secondary, tertiary or university education in public institutions or on vocational courses accredited by the Ministry of Labour, Employment and Social Security. The programme is currently overseen by the Ministry of Education (*Ministerio de Educación de la Nación*) and its costs vary depending on the educational level and year attained.

Figure 1. *Distribution of IFE beneficiaries by sex and age, July 2020*



Source: Compiled by the authors based on National Social Security Administration (ANSES) data (2020).

Figure 2. *Distribution of IFE beneficiaries by modality or employment status, July 2020*



Source: Compiled by the authors based on National Social Security Administration (ANSES) data (2020).

vulnerability, have the highest proportion of IFE beneficiaries in relation to their populations aged 18–64. By contrast, the Autonomous City of Buenos Aires (*Ciudad Autónoma de Buenos Aires* – CABA) and the Patagonian region have a lower proportion of IFE beneficiaries than the national average.[9]

Data and methodology

Data

This analysis is based on Permanent Household Survey (*Encuesta Permanente de Hogares* – EPH) micro data collected by Argentina's National Institute of Statistics and Censuses (*Instituto Nacional de Estadística y Censos* – INDEC). The EPH survey covers 32 urban regions and represents around 62 per cent of the country's population. The EPH is carried out quarterly, with approximately 25,000 households surveyed in each round. The survey uses a 2x2x2 rotation scheme, in which a household is surveyed two quarters in a row, then drops out of the sample for two consecutive quarters and re-enters for the following two quarters, allowing for the construction of 18-month panels. For each quarter, 25 per cent of the sample is made up of households that are being surveyed for the first time.

Our empirical analysis involves measuring the IFE's impact on women's empowerment by considering a number of factors that reflect women's power. To do this we first take, as proxy variables for empowerment, reported female heads of household and potential female economic leadership. This dual analysis is interesting as the former relates to a (subjective) perception of household headship, while the latter is based on a uniform and universally applied criterion that does not depend on a respondent's value judgement, but instead on the assumption that economic leadership is associated (to a certain extent) with greater bargaining power within the household.

This assumption is supported by empirical evidence suggesting that an unexpected increase in the income of one household member increases that member's bargaining power when it comes to decision making. Thus, if the beneficiaries are women, greater decision-making capacity translates into greater women's empowerment (see, for example, Attanasio and Lechene, 2002; Handa et al., 2009).

In the EPH, the survey respondent is asked to identify the head of the household, which entails an element of bias as this is an open concept left to the discretion of the respondent. Linking empowerment, in contrast, with a

9. This article is supplemented by an online Appendix developed by the authors and made available to readers. See Supporting Information, Appendix A, Figure 1A, which presents the geographical spread in Argentina of IFE beneficiaries as a proportion of the population aged 18–24.

woman's share of household income or with the possibility of her gaining a positive income of her own provides a more standardized indicator, but a narrower one since it only considers the economic aspect of empowerment. The following analysis is enriched by the fact that it considers both of the above elements.

The "female-head-of-household" variable was based on the family relations used in the EPH. To develop the variable that measures a woman's share of household income (a proxy for female economic leadership), the total income of the women in the sample was compared to their overall household income. We also generated a variable indicating the share of a woman's individual income in the income of a couple, as well as a dummy variable that takes the value of 1 when the woman has no income of her own.

Another outcome indicator – one that the literature also relates to women's empowerment – has to do with the distribution of household chores. Taking the questions from the EPH household survey (who does most of the housework and which other people help with these chores), a dummy variable was generated. This variable takes the value of 1 if the woman is solely responsible for household chores.

Other variables considered as part of this empirical analysis were educational level, age, family size and the employment status of the woman's partner. For educational level, a binary variable with a value of 1 indicates whether the woman completed secondary school. As will be detailed in the empirical strategy below, other variables incorporated as controls in the regressions are time and population-density dummies to control for the fixed effects of time and geography.

Empirical strategy

As the goal is to determine the IFE's impact on women's empowerment, our sample is restricted to women aged 18–64 who are either married or in a relationship and are either heads of household or partners. Given that the EPH includes no questions that would mark out IFE beneficiaries, we sought to identify potential programme beneficiaries using an "intention to treat" (ITT) analysis. ITT provides a basis for estimating a programme's impact (Angrist and Pischke, 2009).

As such, we constructed the treatment group based on the requirements for accessing the programme. More specifically, the treatment group sample comprises women aged 18–64 who are heads of household or partners, married or unmarried, who work outside the home (whether they are employers or self-employed), whose income does not exceed the ceiling level for accessing category B of the single-tax system when measured monthly and net of integrated tax, pension and social security deductions. It also includes unemployed women who are not in receipt of unemployment benefit, housewives whose overall household income does not exceed three times the "minimum living wage"

(*salario mínimo, vital y móvil* – SMVM), and women who are paid workers in informal employment.

The control group comprises women aged 18–64 who are heads of household or partners, married or unmarried, who declare themselves to be paid workers, whether in formal employment or self-employed, but whose income exceeds the ceiling level for category B of the single-tax system when measured monthly and net of integrated tax, pension and social security deductions. It also includes housewives whose overall household income exceeds three times the minimum living wage, and unemployed women in receipt of unemployment benefit.

Table 1 provides a breakdown of the potential IFE beneficiaries identified on the basis both of information collected in the EPH in the third quarter of 2020 and of ANSES data relating to the first IFE payment. In both cases, we present them by sex, age group, average age and as a proportion of men and women. The similarity in the values obtained from the two sources reinforces the strategy chosen for identifying the policy's target group.

Table 1. *Distribution of IFE beneficiaries by sex and age group*

EPH data						
	Beneficiaries			Percentage breakdown		
Age group	Men	Women	Total	Men	Women	Total
18–24	809,086	809,238	1,618,325	21.3%	17.7%	19.4%
25–34	1,191,171	1,622,568	2,813,738	31.4%	35.6%	33.7%
35–44	955,430	1,179,200	2,134,630	25.2%	25.9%	25.5%
45 or older	843,014	949,724	1,792,738	22.2%	20.8%	21.4%
Total	3,798,700	4,560,730	8,359,430	100.0%	100.0%	100.0%
Average age: Men: 34.4; Women: 34.7						
ANSES data						
	Beneficiaries			Percentage breakdown		
Age group	Men	Women	Total	Men	Women	Total
18–24	1,148,814	1,345,248	2,494,062	29.3%	27.3%	28.2%
25–34	1,263,499	1,687,211	2,950,710	32.2%	34.2%	33.3%
35–44	710,360	1,038,529	1,748,889	18.1%	21.0%	19.7%
45 or older	799,733	863,667	1,663,400	20.4%	17.5%	18.8%
Total	3,922,406	4,934,655	8,857,061	100.0%	100.0%	100.0%
Average age: Men: 33.4; Women: 33.8						

Source: Compiled by the authors based on ANSES and EPH data, third quarter of 2020.

Table 2. *Descriptive statistics for the full sample: Women aged 18–64 who are either heads of household or partners, married or unmarried*

	Before IFE payments					After IFE payments				
Variables	*Treatment*	*Control*	*Diff.*	*t*	*p-value*	*Treatment*	*Control*	*Diff.*	*t*	*p-value*
Head of household	0.22	0.22	0.00	1.37	0.17	0.26	0.26	0.00	0.33	0.74
Age	40.25	45.06	4.82	57.87	0.00	40.09	46.03	5.94	36.61	0.00
Education to secondary level or higher	0.57	0.70	0.13	36.01	0.00	0.36	0.47	0.11	14.77	0.00
Number of household members	3.86	4.00	0.14	11.73	0.00	3.86	3.91	0.06	2.56	0.01
Woman solely responsible for household chores	0.80	0.70	-0.10	-31.57	0.00	0.72	0.62	-0.09	-13.30	0.00
Partner in work	0.55	0.63	0.08	21.88	0.00	0.35	0.41	0.05	7.14	0.00
Contribution to couple income	0.29	0.41	0.13	51.78	0.00	0.33	0.42	0.08	13.87	0.00
Contribution to overall household income	0.24	0.34	0.11	49.09	0.00	0.28	0.34	0.06	11.05	0.00
Observations	*29,363*	*44,859*				*7,415*	*11,984*			

Note: "Before" includes 2018, 2019 and the first two quarters of 2020; "After" covers the final two quarters of 2020 and the first quarter of 2021. The treatment group comprises women aged 18–64 who are heads of household or partners, married or unmarried, who work outside the home (whether they are employers or self-employed), whose income does not exceed the level for accessing category B of the single-tax system when measured monthly and net of integrated tax, pension and social security deductions. It also includes unemployed women who are not in receipt of unemployment benefit, housewives whose overall household income does not exceed three times the minimum living wage (SMVM), and women who are paid workers in informal employment. The control group comprises the remaining women of the same age who do not meet the criteria for accessing the IFE.

Source: Compiled by the authors based on EPH data collected between the first quarter of 2018 and the first quarter of 2021.

For the calculations, the pre-programme period is taken to be 2018, 2019 and the first half of 2020, and the post-programme period the second half of 2020 and the first quarter of 2021.[10] In addition to the treatment group, we established a control group made up of the remaining women aged 18–64 who did not meet some, or all, of the criteria.

10. Owing to the mandatory lockdown imposed by Decree 297/2020, the EPH for the second quarter of 2020 was carried out by telephone instead of in-person. Since this change in survey modality will have affected the data collected, to capture more precisely the full effect of the IFE, the EPH for the third quarter of 2020 (which saw a return to contacting and interviewing households in-person) was taken as the starting point.

Table 2 sets out the descriptive statistics of the treatment and control groups before and after the policy was implemented. As expected, there are significant differences between the two groups: the eligible women (treatment group) have lower levels of education, hold greater responsibility for housework, and contribute less to household and couple income than those in the control group. In addition, the women in the treatment group are younger and fewer have partners who are in work.

Given the different characteristics observed (and potentially not observed) between the treatment and control groups, we use the difference-in-differences (DID) method to estimate the IFE's impact on female household headship. The DID estimator measures the difference in outcomes between participants and non-participants before and after the programme, thereby identifying the average benefit conferred by the programme. In this case, DID identifies ITT effects (Card, 1990; Card and Krueger, 1994).

The following identification assumptions are necessary if we are to apply this methodology: i) that the trends in the outcome variables would have been the same in the absence of the IFE, and ii) that there were no other events contemporaneous to the implementation of the IFE that could have caused a differential impact on the outcome of interest between the two groups. As regards the latter point, while other policy measures were taken to mitigate the negative effects of the COVID-19 pandemic, none specifically targeted this treatment group.[11] Furthermore, regarding the former assumption, a placebo experiment is included at the end of the article to help analyse the validity of the findings.

The following model is therefore postulated:

$$Y_{it} = \alpha + \beta_1 T_i + \beta_2 \text{P}ost_t + \beta_3 (T_i \cdot Post_t) + \delta_i^a + \delta_t + \theta X_i + \mu_{it} \qquad (1)$$

where Y_{it} is the outcome of interest for an individual i at moment t; T_i is a dummy variable that takes the value of 1 if the woman is eligible for the IFE (in other words, those women presenting the aforementioned characteristics in the EPH), and 0 otherwise; $Post_t$ is a binary variable with the value of 1 for the post-treatment period (third quarter of 2020 to first quarter of 2021); $\delta_i^a y\, \delta_t$ are dummy variables that represent effects and control for population density and time (quarter-year); and X_i is a vector of individual controls. The said controls

11. Another policy of note is the Assistance to Work and Production Programme (*Programa de Asistencia al Trabajo y la Producción* – ATP), comprising the following five measures: a compensatory salary allowance, interest-free loans for single-tax contributors and the self-employed, convertible subsidized-rate loans, reimbursement of convertible subsidized-rate loans, and a comprehensive unemployment benefit system. In addition to this programme, the interest on loans granted to retirees and pensioners was not capitalized and they were also given a financial support bonus, as was the case for workers in the health care (*Bono Salud*) and cultural (*Bono Sostener Cultura*) sectors.

include the woman's age, a binary variable indicating if her partner is in work, a dummy variable indicating if she completed secondary school, and the number of people in her household. Finally, μ_{it} is an idiosyncratic error term. The DID estimator is the difference between groups (treatment group and control group) over time (before and after the programme) and corresponds to the coefficient β_3 in equation (1), which captures the IFE's impact on the outcome variables.

In addition to the above linear model, we estimate non-linear models when the dependent variable is a dummy variable. In this case, we use a Probit model to estimate the causal effect of the treatment on the probability of the woman being a head of household and on that of her being solely responsible for household chores, under the following specification:

$$\Pr(Y_{it}) = \Phi\left(\alpha + \beta_1 T_i + \beta_2 Post_t + \beta_3 (T_i \cdot Post_t) + \delta_i^a + \delta_t + \theta X_i + \mu_{it}\right) \quad (2)$$

where Pr(.) denotes probability.

Since this is a non-linear model, the marginal effect of the programme on the probability of occurrence of the variable of interest is given by:

$$\frac{\delta \Pr(Y_{it})}{\delta (T_i \cdot Post_t)} = \frac{\delta F\left(\alpha + \beta_1 T_i + \beta_2 Post_t + \beta_3 (T_i \cdot Post_t) + \delta_i^a + \delta_t + \theta X_i + \mu_{it}\right)}{\delta (T_i \cdot Post_t)} = \\ = f\left(\alpha + \beta_1 T_i + \beta_2 Post_t + \beta_3 (T_i \cdot Post_t) + \delta_i^a + \delta_t + \theta X_i + \mu_{it}\right)\beta_3 \quad (3)$$

Results

We commence with a simple unconditional analysis, comparing the mean values of the selected women's empowerment variables from the data in Table 2. The data suggests that the IFE has had an impact on women's empowerment. As shown in Table 3, the percentage of female heads of household eligible for the programme increased by 3.5 p.p. following the introduction of IFE, while the control group saw an increase of 3.1 p.p. This slight difference translates into a before/after impact of just 0.21 per cent, which could lead us to extrapolate that, in principle, there was no significant impact on the number of female heads of household reported.

However, it is found that women's average share of, both, couple income and household income improved through the programme's introduction. As can be seen, the average female income share increased by approximately 4.8 p.p. after the IFE, while the increase for the control group was between 0.3 p.p. and 0.7 p.p. This equates to an impact on female economic leadership of between 4.2 per cent and 4.5 per cent.

Table 3. *Female heads of household: Treatment and control groups before and after the IFE across the entire sample of women*

Reported female head of household			
	Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	21.98	22.40	-0.43
After IFE	25.50	25.72	-0.22
After-Before	3.53	3.31	**0.21**
Woman's share of couple income			
	Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	28.51	41.16	-12.65
After IFE	33.36	41.84	-8.48
After-Before	4.85	0.68	**4.17**
Woman's share of household income			
	Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	23.62	34.16	-10.54
After IFE	28.44	34.48	-6.04
After-Before	4.82	0.32	**4.49**
Woman solely responsible for household chores			
	Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	79.93	69.56	10.37
After IFE	71.72	62.45	9.27
After-Before	-8.21	-7.11	**-1.10**

Note: "Before" includes 2018, 2019 and the first two quarters of 2020; "After" covers the final two quarters of 2020 and the first quarter of 2021. The treatment group comprises women aged 18–64 who are heads of household or partners, married or unmarried, who work outside the home (whether they are employers or self-employed), whose income does not exceed the level for accessing category B of the single-tax system when measured monthly and net of integrated tax, pension and social security deductions. It also includes unemployed women who are not in receipt of unemployment benefit, housewives whose overall household income does not exceed three times the minimum living wage (SMVM), and women who are paid workers in informal employment. The control group comprises the remaining women of the same age who do not meet the criteria for accessing the IFE.

Source: Compiled by the authors based on EPH data collected between the first quarter of 2018 and the first quarter of 2021.

Finally, while the percentage of women who are solely responsible for household chores decreased after the IFE in both treatment and control groups, the reduction was 1.1 p.p. greater for eligible women, reflecting a possible effect on women's empowerment (see Supporting Information, Appendix B).[12]

12. This article is supplemented by an online Appendix developed by the authors and made available to readers (see Supporting Information, Appendix B, Tables B1–B4).

Table 4. *Marginal effect of the IFE on women's empowerment across the whole sample*

	Female head of household	*Share of household income*	*Share of couple income*	*Woman solely responsible for household chores*
T*Post	-0.002	0.026***	0.023***	-0.030**
SE	(0.006)	(0.005)	(0.005)	(0.012)
Observations	93.621	70.747	76.333	84.876
Pseudo R^2	0.094			0.073
R^2		0.200	0.174	

Note: Clustered standard errors at an agglomerated level shown in parentheses. The sample comprises women aged 18–64 who are heads of household or partners, married or unmarried. In all specifications we also control for age, whether the woman's partner is in work, the number of household members, the dummy variable relating to whether the woman completed secondary education, the population-density dummy and the dummy controlling for the fixed effects of time (quarter-year). Asterisks indicate the level of significance: *p-value<10% **p-value<5% and ***p-value<1%.

Source: Compiled by the authors based on EPH data collected between the first quarter of 2018 and the first quarter of 2021.

Given the evidence emerging from this simple unconditional analysis, we expect the results regarding the IFE's impact on the variables of interest to be confirmed when applying a more robust methodology. Accordingly, Table 4 shows the marginal effect of the IFE on the various indicators of women's empowerment based on the estimation of the models in equations (2) and (3).

The number of reported female heads of household apart, significant positive impacts are observed for all the other outcome variables. As far as women's share of household and couple income is concerned, increases of 2.6 p.p. and 2.3 p.p., respectively, can be observed on the pre-IFE figures. This means that women's share of household and couple income rose by around 11 per cent and 8 per cent following the IFE roll out. When it comes to the distribution of household chores, the probability of women being solely responsible for these fell by 3.0 p.p., or 4 per cent, in relation to pre-programme levels.

In addition to these findings, it is important to explore whether the IFE's impact on women's empowerment is consistent across different groups of women. In particular, information can be added to discover the effects on women with higher or lower levels of education. Given the positive association between income and education levels, any differential impacts that emerge will provide information on women's empowerment and economic vulnerability. In this respect, Table 5 and Table 6 show that, when it comes to variables representing female economic leadership, the effect always manifests as expected (positive for women's contribution to household and couple income) and the magnitude is greater in the group of women with lower levels of education. In the case of reported female heads of household, whether the impact shows as positive (+) or negative (-)

Table 5. *Female heads of household. Treatment and control groups before and after the IFE by level of education*

Women who did not complete secondary education				Women who completed secondary education			
Reported female head of household							
	Treatment (a)	Control (b)	*(a)-(b)*		Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	24.37	23.89	0.48	Before IFE	20.15	21.76	-1.60
After IFE	26.61	26.28	0.33	After IFE	23.57	25.09	-1.52
After-Before	2.24	2.39	**-0.15**	*After-Before*	3.42	3.33	**0.09**
Woman's share of couple income							
	Treatment (a)	Control (b)	*(a)-(b)*		Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	30.31	36.36	-6.05	Before IFE	27.01	43.36	-16.34
After IFE	36.37	37.02	-0.65	After IFE	31.01	43.92	-12.91
After-Before	6.06	0.66	**5.40**	*After-Before*	3.99	0.56	**3.43**
Woman's share of overall household income							
	Treatment (a)	Control (b)	*(a)-(b)*		Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	24.82	27.18	-2.36	Before IFE	22.63	37.31	-14.68
After IFE	30.43	27.30	3.14	After IFE	26.88	37.63	-10.75
After-Before	5.61	0.12	**5.49**	*After-Before*	4.25	0.32	**3.93**
Woman solely responsible for household chores							
	Treatment (a)	Control (b)	*(a)-(b)*		Treatment (a)	Control (b)	*(a)-(b)*
Before IFE	81.93	73.96	7.98	Before IFE	78.41	67.64	10.77
After IFE	72.74	63.67	9.07	After IFE	69.94	61.08	8.86
After-Before	-9.20	-10.29	**1.09**	*After-Before*	-8.46	-6.56	**-1.91**

Note: "Before" includes 2018, 2019 and the first two quarters of 2020; "After" covers the final two quarters of 2020 and the first quarter of 2021. The treatment group comprises women aged 18–64 who are heads of household or partners, married or unmarried, who work outside the home (whether they are employers or self-employed), whose income does not exceed the level for accessing category B of the single-tax system when measures monthly and net of integrated tax, pension and social security deductions. It also includes unemployed women who are not in receipt of unemployment benefit, housewives whose overall household income does not exceed three times the minimum living wage (SMVM), and women who are paid workers in informal employment. The control group comprises the remaining women of the same age who do not meet the criteria for accessing the IFE.

Source: Compiled by the authors based on EPH data collected between the first quarter of 2018 and the first quarter of 2021.

depends on the level of education of the women concerned, and the magnitudes are very small (-0.15 per cent and +0.09 per cent). It is a similar picture when it comes to sole female responsibility for household chores. We will examine below whether these results hold true when performing the conditional analysis.

As for the full sample, the IFE does not have a significant impact on the number of reported female heads of household in either of the education groups, yet its effects are significant, and in the direction anticipated in all the other regressions. In the models representing female economic leadership, the effects are greater in

Table 6. *Marginal effect of the IFE on women's empowerment by level of education*

	Women who did not complete secondary education			
	Female head of household	*Share of household income*	*Share of couple income*	*Woman solely responsible for household chores*
T*Post	0.008	0.036***	0.029***	-0.002
SE	(0.009)	(0.006)	(0.010)	(0.012)
Observations	37.384	25.671	27.808	34.287
Pseudo R^2	0.120			0.088
R^2		0.097	0.098	
	Women who completed secondary education			
	Female head of household	*Share of household income*	*Share of couple income*	*Woman solely responsible for household chores*
T*Post	-0.003	0.020**	0.016**	-0.046**
SE	(0.010)	(0.008)	(0.008)	(0.019)
Observations	56.237	45.076	48.525	50.589
Pseudo R^2	0.080			0.067
R^2		0.268	0.234	

Note: Clustered standard errors at an agglomerated level shown in parentheses. The sample comprises women aged 18–64 who are heads of household or partners, married or unmarried. The dependent variables are a dummy variable that takes the value of 1 if the woman is the head of the household; the woman's share of overall household income and couple income; and a dummy variable that takes the value of 1 if the woman holds sole responsibility for household chores. In all specifications, we also control for age, whether the woman's partner is in work, the number of household members, the population-density dummy and the dummy controlling for the fixed effects of time (quarter-year). Asterisks indicate the level of significance: *p-value<10%, **p-value<5% and ***p-value<1%.

Source: Compiled by the authors based on EPH data collected between the first quarter of 2018 and the first quarter of 2021.

the group of women with lower levels of education. While the probability of a woman holding sole responsibility for household chores sees a statistically significant drop of 4.6 p.p. among the women with higher levels of education, it appears that the IFE did not change anything in this regard for those less educated.

We conclude this analysis with a placebo experiment to test the validity of the findings. To this end, equations (1) and (2) are re-estimated for the pre-programme period – in other words, the first quarter of 2018 to the second quarter of 2020 inclusive. For the placebo experiment, we take the first quarter of 2018 through to the second quarter of 2019 as the pre-treatment period and the third quarter of 2019 to the second quarter of 2020 as the post-programme period. As shown in Table 7, the IFE's causal impact was not significant in any of the cases analysed, thereby supporting the validity of our findings.

Table 7. *Placebo experiment. Marginal effect of the IFE on women's empowerment*

	Female head of household	*Share of household income*	*Share of couple income*	*Woman solely responsible for household chores*
T*Post	-0.007	0.008	0.010	-0.012
SE	(0.005)	(0.007)	(0.007)	(0.009)
Observations	74.222	60.436	65.256	65.477
Pseudo R^2	0.097			0.073
R^2		0.207	0.180	

Note: Clustered standard errors at an agglomerated level shown in parentheses. The sample comprises women aged 18–64 who are heads of household, married or unmarried. The dependent variables are a dummy variable that takes the value of 1 if the woman is the head of the household; the woman's share of overall household income and couple income; and a dummy variable that takes the value of 1 if the woman holds sole responsibility for household chores. In all specifications we also control for age, whether the woman's partner is in work, the number of household members, the population-density dummy and the dummy controlling for the fixed effects of time (quarter-year). Asterisks indicate the level of significance: *p-value<10%, **p-value<5% and ***p-value<1%.

Source: Compiled by the authors based on EPH data, using the first quarter of 2018 to second quarter of 2019 as the pre-programme period and the third quarter of 2019 to second quarter of 2020 as the post-programme period.

Table 8. *Marginal effect of the IFE on women's empowerment using alternative controls*

	Female head of household	*Share of household income*	*Share of couple income*	*Woman solely responsible for household chores*
	Control (i): Women whose PCHI is less than or equal to the median			
T*Post	0,017*	0,023***	0,032***	-0,026**
SE	(0,009)	(0,006)	(0,007)	(0,011)
Observations	53.284	47.402	47.582	48.326
Pseudo R^2	0,122			0,080
R^2		0,161	0,165	
	Control (ii): Ineligible women belonging to households that do meet the IFE criteria			
T*Post	0,036***	0,037***	0,041***	-0,013
SE	(0,010)	(0,010)	(0,010)	(0,014)
Observations	54.458	39.999	42.827	49.711

(Continued)

Table 8. *Marginal effect of the IFE on women's empowerment using alternative controls* - Continued

	Female head of household	*Share of household income*	*Share of couple income*	*Woman solely responsible for household chores*
Pseudo R^2	0,133			0,068
R^2		0,199	0,305	
		Control (iii): Women (i)+(ii)		
T*Post	0,053***	0,053***	0,023**	-0,005
SE	(0,014)	(0,011)	(0,011)	(0,013)
Observations	45,371	34,371	36,151	41,284
Pseudo R^2	0.138			0.067
R^2		0,183	0,170	0,000

Note: Asterisks indicate the level of significance: *p-value<10%, **p-value<5% and ***p-value<1%.

Source: Compiled by the authors based on EPH data collected between the first of quarter of 2018 and the first quarter of 2021.

In order to verify the robustness of the results, the IFE's impact was estimated using three alternative control groups: i) ineligible women with a per capita household income (PCHI) less than or equal to decile 5; ii) women who do not meet the individual requirements for IFE eligibility, but whose household does; and iii) a combination of the two aforementioned groups; namely, women with a PCHI less than or equal to the median and living in households that are eligible for IFE (although they do not themselves meet the IFE criteria). As can be seen in Table 8, this exercise reinforces the results of this study, although the impact on the probability of women being solely responsible for household chores is no longer statistically significant in two of the three alternative controls (while still decreasing). By contrast, the impact on the number of women self-reporting as heads of household is statistically significant when the least vulnerable individuals are removed from the comparison group.

Conclusions

Throughout this article, we have evaluated the impact of the Emergency Family Income (IFE), implemented in Argentina as an emergency measure in response to the COVID-19 pandemic, on certain features of women's empowerment. The empirical strategy uses data sourced from the country's Permanent Household Survey (EPH) for the 2018 to 2021 period and applies the non-experimental difference-in-differences (DID) technique through the

construction of an eligible group and a control group, both identified on the basis of intention to treat.

The evidence suggests that, although they are linked, the concepts of reported head of household and economic leadership are not one and the same. Indeed, in no case was there a statistically significant impact on the number of female heads of household reported, yet there is evidence of the IFE having an impact on the variables denoting economic empowerment. Women's share of couple income is found to have increased by around 8 per cent following the IFE, while their share of household income rose by some 11 per cent because of the monetary transfer. These results are supported by an analysis of groups of women with different levels of education, which shows a greater impact on women with lower levels of education. This finding is interesting in that it reveals that the most vulnerable women within the eligible group benefitted most from the policy.

Another important finding is the IFE's impact on the distribution of household chores: the probability of women being solely responsible for housework drops by 4 per cent following payment of the IFE. This finding would indicate an IFE-related strengthening of women's intra-household bargaining power across the total sample, yet when separating women by educational level, only the result for the most educated group shows a statistically significant impact.

A sensitivity analysis was carried out, considering different alternative control groups in the estimations. When restricting the sample to women whose PCHI lies within the first 5 deciles, the result shows a statistically significant increase in the reported number of female heads of household, with the probability of these women being heads of household up by 1.7 p.p. on pre-programme levels. This significance is mirrored when, on the one hand, controlling for women in households with IFE-eligible characteristics and, on the other hand, combining the condition of a PCHI less than or equal to the median with IFE-eligible households. However, the distribution of household chores is not affected by the IFE in two of the three controls analysed, with women remaining solely responsible for household tasks in those cases.

These results provide a framework for the role that public income transfer policies can play in reducing gender gaps. While the IFE was an emergency income measure that did not set out to target gender issues, it has clearly had a positive impact on women's empowerment. In this sense, these findings reinforce the idea that public policies are an indispensable tool for shifting the dynamic regarding the traditional roles assigned to women, thereby consolidating the cultural changes that are taking place not only in Argentina, but in Latin America as a whole.

13. See Decree 297/2020 for details of essential activities.

Finally, it is important to mention two limitations of the study. The first relates to the scarcity of public information at a micro-data level that would allow for an analysis of the actual beneficiaries. The use of "intention to treat" (ITT) to identify the treatment group served to circumvent this information constraint. Furthermore, a placebo experiment was conducted to verify the robustness of the results, and the "theoretical" IFE data was not found to have impacted on any of the empowerment variables analysed. Subsequent studies could include an analysis by sector of activity, taking into account the types of key labour reported for particular activities (such as health care, certain public-sector jobs, transport sector, security forces, etc.) and how they relate to the degree of feminization in these sectors.[13]

The second has to do with the concepts that lie behind women's empowerment. By definition, women's empowerment is a broad term that encompasses a number of different dimensions, both individual and collective. In addition to economic and labour aspects, it also includes aspects relating to politics, health (including fertility), education, and violence (such as sexual or religious violence), among others. This study focuses on just some of these dimensions, with an emphasis on female household headship (both in terms of self-perception and economics) and on the distribution of household chores, considering these dimensions to be a reflection of women's empowerment. The findings of this article could therefore be considered the lower limit of the full effects of the IFE on women's empowerment. Future studies could look at the IFE's impact on other aspects of empowerment with a view to obtaining a more comprehensive picture.

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Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of this article.

The potential impact of introducing a social security system in the State of Palestine: A computable general equilibrium approach

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Abstract This article assesses the potential impact for the State of Palestine (West Bank and Gaza) of enforcing the enactment of the currently suspended Social Security Law (No. 19 of 2016). Using a computable general equilibrium model, we simulate different scenarios associated with the enactment of the social security system on key macroeconomic variables, such as GDP, private consumption, government spending, investment and employment, for the period 2020–2030. We evaluate the influence on the economy of introducing a social security system for private-sector workers, as set out in the 2016 law, and compare the simulation results of each scenario to the baseline. In each scenario, we consider different options concerning severance payment duration and different options for the investment strategy of social security contributions. However, for employees in Gaza, the article does not consider severance payments due to economic difficulties and the Israeli closure policy.

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Introduction

In September 2016, the Palestinian President issued a decree for a new Social Security Law (No. 19 of 2016). This aimed to create a comprehensive social security system for the State of Palestine that would extend coverage to those working in the private sector and their families. The system, financed by contributions by workers and employers, aimed to provide old-age, disability and survivors pensions; funeral grants; employment injury benefits and medical care; maternity cash benefits; and a minimum pension (ILO, 2018). With a population of 4.8 million Palestinians, this reform sought to extent coverage to the majority of the private-sector workforce who were without social security coverage.

Currently in the State of Palestine, only public-sector workers, in addition to those working for local bodies and some non-governmental civil society organizations, have pension coverage for old-age, disability and survivorship (Law of Public Retirement No. 7 of 2005, article 25).[1] Based on official data from the Palestinian Labour Force Survey conducted in 2018 (PCBS, 2019), public-sector workers represent 20.4 per cent of the workforce (including those working for the Government in Gaza), while 65.8 per cent of the workforce are private-sector workers, and 13.8 per cent are employed in Israel and West Bank settlements.

To administer the system, a financially and administratively independent Palestinian Social Security Corporation (PSSC) was established in October 2016.[2] The Palestinian Authority responsible for the State of Palestine and the International Labour Organization (ILO) signed an Implementation Agreement to support the establishment of the PSSC. The Corporation is officially mandated to manage the State of Palestine's social security system to cover all private-sector workers, as per the objective of the 2016 Social Security Law.

The current Palestinian Labour Law No.7 of 2000 provides an alternative to old-age retirement and unemployment insurance (article 48), through a system of severance pay at job exit (end of service bonus). The system provides one third of the last monthly salary for each year of tenure in the same job if the worker has less than 5 years of tenure; two-thirds of the last monthly salary for

1. See full text of Law of Public Retirement No. 7 of 2005.
2. The PSSC was officially inaugurated in April 2018 (ILO, 2018).

each year of tenure if the worker has 5–9 years of tenure; and one monthly salary for each year of tenure if the worker has 10 years of tenure or more.

However, the compliance rate with the severance payment system provided under the labour law is very low, with 24.9 per cent of waged employees in the private sector (27.4 per cent in the West Bank and 19.0 per cent in Gaza) having access to severance pay rights (PCBS, 2019). Typically, it is mostly large enterprises in the private sector that comply with the severance payment system. The complying enterprises usually take full financial responsibility for the severance payments but do so without having special accumulated funds set aside to meet the costs of severance payments for their exiting employees.[3] Instead, the enterprises provide severance payments directly to the exiting employees and account for the severance payments in the wage bill. This payment mechanism for the severance scheme may be understood as a form of "pay-as-you-go", where the current wage bill reflects wages paid to current employees as well as severance pay to exiting employees.

The implementation of the 2016 Social Security Law should have taken place in November 2018. However, a civic movement against the application of the law in the State of Palestine caused the Palestinian Authority to suspend the application of the social security system in January 2019, to allow further discussions with trade union and private-sector representatives.

Several concerns drove this civic movement. Among these were political instability and uncertainty about the future role of the Palestinian Authority, including a lack of confidence in the rule of law to govern the PSSC. In the State of Palestine, where there is a high level of political risk, social insurance should help sustain the well-being of Palestinian workers and guarantee stable income levels. Yet, the high level of political risk may also affect the PSSC's operations. Thus, the low level of public confidence in the social security system is an important issue.

Also important is the economic slowdown experienced by the State of Palestine since 2016, which has seen deteriorating labour market conditions including increases in the unemployment rate and lower wage levels (ILO, 2019). Preliminary estimates from the Palestinian Central Bureau of Statistics (PCBS) national accounts for 2018 indicated a slowdown in the GDP growth rate to 0.7 per cent, compared to 3 per cent in 2017, a decrease in GDP per capita by 1.5 per cent, and an increase in the unemployment rate from 28.8 per cent in 2017 to 30.7 per cent in 2018. The PCBS forecasts for the economy of the State of Palestine for 2019 were more pessimistic, with an expected growth rate of 0.5 per cent, an expected decrease in GDP per capita by 1.6 per cent, and an

3. As reported by Wafa, the Palestinian news and information agency, on 23 February 2014 (in Arabic).

increase in the unemployment rate to reach 31.5 per cent (PCBS, 2018). These economic conditions – i.e., the absence of a positive economic growth rate – present challenges for the proposed introduction of a funded social security system.

Hilal, Johnson and Musa (2003) argued that "addressing crucial social needs of vulnerable sectors of Palestinian society requires the institution of a social security system". The authors recommended prioritizing the introduction of new social programmes in stages, starting by health and education support programmes for low-income groups and, thereafter, universal health insurance and unemployment insurance. They argued to prioritize these programmes to reduce poverty and inequality in the initial stage, thereafter the social security system could integrate other programmes. This suggests that the implementation of the 2016 Social Security Law in the State of Palestine has differed in that it envisaged, first, only the creation of a funded pension system, ignoring the other social priorities in Palestinian society.

Other reservations reported in the local media concerning the enactment of the Social Security Law included employers' concerns about increased labour costs, as well as questions relating to the investment of workers' and employers' contributions, the right to eligibility to receive the retirement pension of the deceased spouse, and the perceived risk concerning the financial sustainability of the social security fund to be managed by the Palestinian Authority. A further point of criticism was that the Social Security Law did not set a timeline for broadening coverage to include other social insurance benefits, such as health insurance and unemployment insurance.

Finally, a decision by the Palestinian constitutional court obliged employers to provide severance pay for workers for their previous years of employment with the enterprise prior to the introduction of the 2016 law, calculated as one month's salary per year of tenure, regardless of whether they intended to leave their jobs. However, the decision concerning when this severance pay should be paid was left to negotiations between employers and employees' representatives.

As stated, the 2017 enactment of the Social Security Law has been suspended. Nevertheless, the objective of this article is to assess the potential impact of enforcing the enactment of the Social Security Law in the State of Palestine, specifically West Bank and Gaza, on key macroeconomic variables such as GDP, private consumption, government spending, investment and employment. The aim is that this article will contribute positively to the efforts of policy makers in revising the enforcement process of the law. To assess the possible impact of the law under different options of enforcement, we have assumed different scenarios of compliance with the social security law over a ten-year period, 2020–2030, to evaluate the influence on the economy of the State of Palestine of introducing the social security system. We compare the simulation results of each scenario to the baseline, which represents the current status of the economy without

introducing the social security system. In each scenario, we consider different options concerning the duration of the period over which the severance benefit will be paid and different options for the investment strategy to be used for social security contributions. However, for employees in Gaza, this study does not consider the payment of severance benefits due to economic difficulties and the "Israeli closure policy" (i.e., the policy of separation between the Gaza Strip and the West Bank).

The article is organized as follows. Next, we offer the literature review and describe the Palestinian Social Security Law. In turn, using a computable general equilibrium (CGE) model, we simulate different scenarios associated with the introduction of the social security system on key macroeconomic variables in the State of Palestine. We discuss the model specification, present the simulation scenarios and explain the simulation results before offering conclusions and policy recommendations.

Literature review

The implications of introducing a social security system

The extension of social security coverage is considered among the top priorities for national development because of its positive social and economic impacts. It is also an important component of national strategies to enhance human development, political stability and economic growth (ILO, 2017). Broader social protection coverage ensures income stability and extends access to health care as well as supporting access to the education system (Devereux and Sabates-Wheeler, 2004; Barrientos and Hulme, 2009). By helping to raise household incomes, social protection plays a significant role in strengthening local economic demand and realizing sustainable growth (Alderman and Yemtsov, 2013; Davis et al., 2016; Lee and Torm, 2017).

The absence of social protection leaves people exposed to the financial risks associated with life cycle events and labour market contingencies, such as ill health, maternity, old age and unemployment. Limited access to social protection also presents a major challenge to the achievement of social and economic development, by leaving unaddressed issues such as income inequality, poverty and economic uncertainty. Studies have demonstrated the important contribution of social protection to the stability of consumption and thus to the reduction of inequalities (Midgley, 2020) in Asia (ESCAP, 2015), Eastern Europe (Hallaert, 2020) and Latin America (López-Calva and Lustig, 2010; Ocampo and Gómez-Arteaga, 2017), as well to promote inclusive growth (IMF, 2014; Ostry, Berg and Tsangarides, 2014).

Despite the observed positive social and economic outcomes, there is some controversy about how social security benefits, and pensions in particular, should be financed. A pay-as-you-go system (which is financed mainly by the contributions of the current active generation) benefits the oldest generation at the time of the introduction of the social security system by allowing them access to social security benefits without them having contributed. An alternative approach is for the active generation of workers to finance their future benefits through creating a fund based on their own contributions. During workers' active years, the accumulating contributions are expected to provide a source of funds for new investments in productive assets to support economic growth. Engen and Gale (1997) find that introducing a pay-as-you-go social security system (i.e., without fund accumulation and thus without an investment strategy, but where the current generation of workers' contributions pay benefits to the older generation) would imply a decline in private savings. They suggest that this would not be the case under a funded (capitalized) social security system. Yet, Feldstein and Liebman (2001) find that a funded social security system will not change the savings rate because the younger generation of workers will simply substitute the same amount from personal savings to their social security contributions. However, it is argued that the net present value of consumption can be raised if two conditions are met. First, the return on capital exceeds the return in the pay-as-you-go system. Second, the capital intensity in the economy is initially below the welfare maximizing level (i.e., the marginal product of capital exceeds the consumption discount rate). These conditions are deemed to occur in a context of positive economic growth (Feldstein and Liebman, 2001).

The impact of social security: Empirical evidence

Although the theories explained above seek to address the positive effect of social security financing on economic growth, the empirical evidence is ambiguous. While some researchers find a positive effect of social security on economic growth (Bellitini and Berti Ceroni, 2000; Alam, Sultana and Butt, 2010), others find a negative or non-significant effect on economic growth (Dollar and Kraay, 2000; Justino, 2003). These results depend on the behaviour of workers, employers and investors (ILO, 2001). On the one hand, the positive effect can be captured by the investment of social security contributions, while the payment of social security benefits, including retirement pensions, unemployment insurance benefits and health insurance, can support personal and household consumption levels. On the other hand, contributory compliance with the social security system would increase employers' labour costs, including their need to comply with the statutory minimum wage. This can result in reduced labour demand,

higher unemployment and lower consumption in the short run (Nickell and Layard, 1999; Justino, 2003). Moreover, deductions from wages in the form of social security contributions would reduce personal saving levels (Lesnoy and Leimer, 1985; Cigno, Casolaro and Rosati, 2002). Thus, for the State of Palestine, the outcome of these contradictory effects on consumption depends on the compliance rate with the Social Security Law, the investment strategy for contributions, the investment decisions of the private sector as well as the composition of the basket of social security benefits.

The introduction of social security systems in developing economies is often a challenge because of immature capital and financial markets (Zheng, 2006; Gustman, Steinmeier and Tabatabai, 2010). In addition, developing economies are generally characterized by high levels of unemployment and poverty, and governments commonly have a fragile tax collection system and low levels of income (Ginneken, 2003).

To reduce widespread poverty, governments may be required to implement universal social programmes, which will also necessitate finding the fiscal space. Moreover, social pressure against the implementation of contributory social security systems is frequently high in developing economies because of high levels of employment in the informal economy, workers switching between formal and informal work relations (Sumarto, 2017), and the time lag between the implementation of social programmes and the receipt of benefits from the invested funds of social security contributions (Desai and Rudra, 2019). These problems have directed some researchers and policy makers to debate that poverty abolition and socioeconomic security of the poor would rather be obtained by economic growth (Dollar and Kraay, 2000). This viewpoint sits in contrast to national experiences in developing economies.

For example, in 1995, the Government of India introduced the National Social Assistance Programme (NSAP), which includes the provision of social assistance benefits for poor households in the event of old age, the death of employees, and maternity. A significant element of India's social protection system is the food programme, realized in the late 1960s and included as part of a wider rural poverty improvement scheme. This wider programme focuses on land reforms and the introduction of new knowledge, technologies and crops in the agriculture sector, as well as a widespread rural employment scheme to help address the unemployment problems of landless rural workers. Justino (2003) argues that adequate social security policies can be an important endogenous factor in the process of socio-political development and economic growth of developing economies. Using a two-stage least squares model adapted to panel data from 14 major Indian states, it was shown that increasing social security benefits had positive impacts on poverty alleviation and increases in income growth and consumption expenditure in India. However, the immediate effect of introducing

a social security programme is to decrease economic growth and increase poverty, because of lower rates of saving and consumption.

Similarly, Deng, Tian and Chen (2019) observed how social security in the People's Republic of China (hereafter, China) has affected urban residents' consumption. A positive impact of China's social security system on urban residents' consumption expenditure is mainly realized through the following two channels: i) by narrowing the income distribution gap, and ii) by reducing uncertainty expectations. Both channels stimulate demand and thus consumption and economic growth.

Considering 14 Asian developing economies, Alam, Sultana and Butt (2010) find a similar result for the impact of social security expenditure on economic growth in the long run, through increasing productivity. According to the authors, productive social expenditure (i.e., which promotes labour productivity) can play an important role in promoting and sustaining economic growth.

For instance, employment-conditional schemes, including reductions in social security contributions for low-paid employees, can benefit low-income households and increase the formal employment of unskilled labour (Bassanini, Rasmussen and Scarpetta, 1999). This would result in higher consumption and employment for the poorer categories, therefore higher economic growth.

Human capital formation is another important channel of social security's impact on economic growth (Bellitini and Berti Ceroni, 2000). Using a panel of 61 countries, Bellitini and Berti Ceroni (2000) find a positive effect of social security on economic growth, with a larger effect in poor countries with underdeveloped social security systems. According to Zhang, Zou and Sha (2019), the initial level of human capital, measured by education level, matters for the impact of social security; when the human capital level is low or high, social security is favourable for sustained economic growth. When the human capital level is low, the productivity of unskilled labour increases with social security and when the level of human capital is high investment in technology combined with skilled labour can promote growth. However, if the human capital level is at an intermediate level, the effect of social security is weak.

Another way to consider the impact of a social security system on key macroeconomic variables, such as savings, economic growth, poverty, unemployment and income, is to apply a computable general equilibrium (CGE) model. For instance, Alzua and Ruffo (2011) analysed the effects of social security reform in Argentina on poverty, employment and wages. They wished to investigate whether social security reform had different impacts across gender, education level and age profile. Using a static multi-sectoral CGE model, the authors deduced that if pension fund assets were assigned to physical investment, then labour demand and wages would increase while poverty would shrink. However, these effects depend on the capital accumulation effect, noting that the

positive effects on employment disappear when the funds for investment are directed toward government bonds.

In what follows, we use a computable general equilibrium (CGE) model to simulate different scenarios associated with the impact of introducing a social security system on key macroeconomic variables in the State of Palestine.

Computable general equilibrium model specification

Computable general equilibrium (CGE) models are integrated simulation models. They are used to simulate different scenarios of economic policy implications. Economists evaluate economic policies based on predicted key macroeconomic variables such as GDP, consumption, investment, foreign trade and labour market outcomes. As stated above, CGE models can be used to consider the impact of a social security system on key macroeconomic variables.

Simulations with different scenarios for economic policies and under different external conditions can make the choice of economic policy more objective. The simulation results are highly sensitive to the model's assumptions and specification. The setting of these assumptions must reflect the economy under analysis.

The "mitigation, adaptation and new technologies applied general equilibrium" (MANAGE) model is a single-country, dynamic recursive and multi-sectoral CGE model. It allows for capital-labour-energy substitution and intra-fuel substitution in the production block. Although the MANAGE model is designed for assessing the impact of policies specific to energy and reducing the effects of climate change through the feature of intra-fuel substitution, this study applies the MANAGE model to assess the impact of applying the 2016 Social Security Law of the State of Palestine. The choice of MANAGE is made because the application of the Social Security Law will only result in the accumulation of contributions over the next ten years since a major part of social security benefits (i.e., retirement income) will start to be paid after ten years of social security contributions (Palestinian Social Security Law no. 19, 2016). Consequently, we do not need dynamic features in the demand side to model the benefits of social security, while the objective of this research is to assess the impact of applying the law in the years following the law's enforcement. Depending on the level of informality in economic activities, different activities are characterized by different compliance rates with the Labour Law as well as with the existing severance payment system. As a result, the degree of compliance with the Social Security Law will also vary across activities. Consequently, we need a multi-sectoral model with a multi-input multi-output production structure such as the MANAGE model. The model has a vintage structure of capital, which

allows to distinguish between old and new capital with a sluggish mobility of old capital.

The MANAGE model follows the standards of CGE models, with parameter calibration, the CGE model's closure rules defining a specific model for the State of Palestine, and the scenarios underlying the policy variables. In standard CGE models, investment behaviour is not modelled but rather determined by the overall level of savings with no distinction between public and private investment. Social security contributions as shares of wages paid by employers and employees are added to total savings.

The Israeli closure rules shape the economy of the State of Palestine. First, we assume fixed labour supply and fixed wages so that employment is determined by labour demand. This implies that labour supply and demand do not necessarily equate. Second, we assume that public savings (deficit) and foreign savings are fixed. Household savings are assumed to be endogenous, but with a fixed average propensity to save. The current account is assumed fixed. Thus, in the case of an increase in the foreign trade deficit, the real exchange rate appreciates. Finally, investment is assumed to be driven by total savings, where changes in savings are perfectly transmitted to investment.[4]

Scenarios of simulation

Different scenarios of simulation over the period 2020–2030 are assumed to assess the impact of introducing a social security system. The scenarios differ in the policy variables, parameters and exogenous variables. In all scenarios, the simulation results are compared to the baseline scenario, which represents the current status of the economy of the State of Palestine without introducing the social security system.

As outlined above, a decision by the Palestinian constitutional court obliges employers to provide severance pay for the previous years worked with the enterprise prior to the law's enforcement, calculated as one-month salary per year of tenure. However, the decision to pay, as well as the decision concerning the maximum duration of the payment period, was left to negotiations between employers and employees' representatives. For this reason, we must consider different options of severance payment. In each scenario except the baseline, we consider five options of severance payment for employees of all compliant sectors in the West Bank,[5] based on their previous tenure:

4. For a full explanation of the model, see van der Mensbrugghe (2017).

5. For employees in Gaza, we do not consider the payment of severance because of economic difficulties and the Israeli closure policy, where the payment of severance may represent an amount that is unaffordable for private-sector enterprises, especially when facing liquidity constraints.

Payment option A. No payment of severance, where the payment of severance for previous years of employment will be paid only upon exit from employment.

Payment option B. Payment of severance by instalments over a 7-year period (on average, one extra monthly salary per year, given that the average number of years of tenure in the current job is 7.3 years).

Payment option C. Payment of severance by instalments over a 5-year period.

Payment option D. Payment of severance by instalments over a 3-year period.

Payment option E. Lump-sum payment of all severance within the first year upon enforcement of the law.

In each scenario, there are three options for the investment strategy for the total social security contributions paid by employees and employers:

Investment option A. Total social security contributions will be added to private and public savings without targeting investment in specific sectors.

Investment option B. 35 per cent of total social security contributions will be equally directed to investment in new capital in the four most elastic sectors of value-added to investment (manufacturing, trade, transportation, and communication).

Investment option C. 50 per cent of total social security contributions will be equally directed to investment in new capital in the four most elastic sectors of value-added to investment (manufacturing, trade, transportation, and communication).

The Supporting Information that accompanies this article[6] shows the elasticity of value added to several factors including investment. The choice of sectors based on the elasticity of value-added to investment was made under the assumption that the PSSC will seek to invest in the most profitable (value-added generating) projects to maximize return to investment. The investment share of social security contributions (35 per cent) in investment option B was the least share required to offset the negative impact of introducing social security on GDP. The share of 50 per cent was subjectively selected, but it is moderately high for a recently established social security body.

The simulation scenarios present a sensitivity analysis for enforcing the Social Security Law by assuming different compliance rates, different investment targeting strategies for social security contributions, and different options for severance payment. This analysis will allow to determine the best conditions for enforcing the 2016 Social Security Law.

6. This article is supplemented by an extensive online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix, Table A.1

Baseline scenario

The baseline scenario represents the current status of the economy, considered as the reference for the other scenarios. In the baseline scenario, we do not assume introducing a social security system. The current conditions in the labour market, in the absence of the 2016 Social Security Law, as well as current compliance with labour market regulation will prevail in the simulation period.

The other exogenous variables, including private transfers, public transfers, foreign transfers and GDP growth (to determine the trend of GDP over the simulation period), are assumed to grow at the same rates as the moving average over four years. GDP growth rate for 2019 is taken from the PCBS forecasting of GDP (0.7 per cent). The population and the labour force are assumed to grow at a constant rate of 2.5 per cent.

The government consumption to GDP ratio is constant based on the Social Accounting Matrix (SAM) value. The government budget deficit grows at the same rate as the real GDP, implying a fixed deficit to GDP ratio over the simulation period. Moreover, the government investment to GDP ratio is a moving average over four years.

The current account balance is assumed to grow at the same rate as GDP, implying a fixed ratio of current account balance to GDP.

Scenario 1

This scenario assumes that only employers who comply with the Labour Law of the State of Palestine will comply with Social Security Law. It means that the Palestinian Authority and the PSSC will not work to enforce the law either in the West Bank or in Gaza. The lack of sufficient power to enforce the law and low confidence in governance in the PSSC justify this assumption.

The data that accompanies this article (see Table A2, in the online Supporting Information) shows firstly that compliance to the severance payment system is lower in Gaza than in the West Bank in all sectors. Second, the most compliant sectors, such as communication, financial services, business services, education and health, mostly employ skilled labour and represent a small proportion of private-sector waged employment.

Scenario 2

The same compliance rates as in scenario 1 are assumed for the year 2020, but the share of complying firms will grow over the next five years (see Table A3, in the online Supporting Information). However, due to the political division

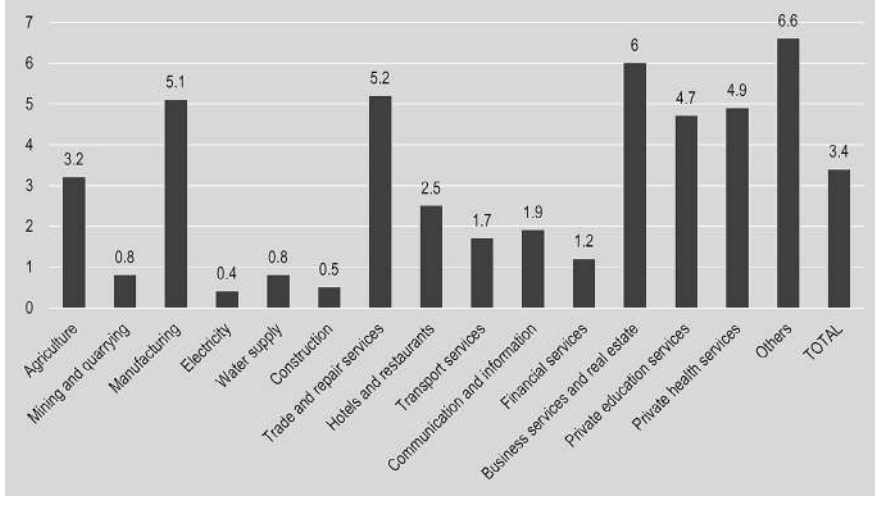
between the West Bank and Gaza and to the difficulty of public institutions to work to enforce law in Gaza, compliance with social security in Gaza is assumed to stagnate at the same rates. To find growth in the compliance rates, we assumed that growth in compliance will be the same as the growth in compliance with social security in Jordan, following the modification of the Jordanian social security law in 2004, where the compliance rate was around 31 per cent and grew to 73 per cent in 2012 (JSSC, 2013). Thus, we assume an annual average growth in compliance by around 5 per cent, with some sectors having lower or higher growth.

Scenario 3

The previous two scenarios ignored the enforcement of the minimum wage, given that only 7.8 per cent of waged workers in the West Bank earn less than the minimum wage (PCBS, 2019). Enforcement of the minimum wage would increase the average wage only by 0.4 per cent, ranging between 0 and 0.7 per cent among the different sectors.

The last scenario assumes the full compliance of all private-sector employees with the social security system in the West Bank. This also implies full compliance with the minimum wage law. This will result in an increase in the average wage by 0.4–6.6 per cent, depending on the sector. Figure 1 shows the potential impact of the enforcement of the minimum wage on the average

Figure 1. *Expected change in the average wage by sector due to minimum wage enforcement (in percentage)*



Source: Authors' elaboration from PCBS Labor Force Survey (PCBS, 2019).

wage under the assumption that it is fully applied on all West Bank private-sector employees.

This scenario excludes Gaza because the full compliance of employees requires a sovereign government in the West Bank and Gaza, and employees in Gaza earn much less than employees in the West Bank.

Simulation results

In each of the scenarios, we present the percentage difference for the key macroeconomic variables with respect to the baseline scenario.

Scenario 1

Enforcement of social security without investment targeting. Regardless of the payment of severance, the five cases explore the positive impact of social security enforcement in the long run: with an increase in real GDP by 8.4 per cent, an increase in labour demand by 7.8–8.0 per cent, an increase in consumption by 4.5 per cent, and an increase in exports by around 17 per cent with respect to the baseline scenario. However, this positive long-run effect uses the assumption that all accumulated social security contributions are pooled with other savings and transformed into investment, but without targeting these investments in specific activities. Nevertheless, savings are not necessarily transformed into investment in economies that have imperfect financial markets. This is one of the weaknesses of CGE models, which cannot capture imperfections in the financial market.

The immediate and short-run impacts of social security enforcement are reductions in GDP, employment, consumption, exports and imports. Moreover, unskilled employees are more affected by this shock than skilled employees. The negative effect is even more pronounced when the severance payment is paid earlier. For instance, GDP would decrease by 0.6 per cent upon enforcement of the Social Security Law without the severance payment compensation, but GDP would decrease by 4.5 per cent upon the enforcement of the law with the payment of all severance benefits within the first year.

These results are consistent with some of those in the literature (e.g., Justino, 2003), showing the negative immediate effect of introducing a social security system on economic growth due to lower consumption and personal savings. However, a positive effect is found in the long run. These differential effects are due to different mechanisms in the short run and long run. In the short run, employers have higher labour costs, which implies lower labour demand. Consumption decreases in the short run because of wage deductions for social security contributions and due to lower labour demand. In the long run,

the accumulated social security contributions are invested and would imply higher labour demand that compensate the negative effect due to the deductions. The increase in labour demand would increase wage income and consumption. The duration of the severance payment does not seem to have any effect in the long run because it is a short-run shock.

The gap between skilled and unskilled labour increases in the short run with a shorter payment period for the severance benefit. Labour demand for skilled labour would decrease by 1.1 per cent, compared to a decrease of 1.3 per cent for unskilled labour, if severance is only paid upon exit from employment. If severance payment is paid within the year of the enforcement of the law, skilled labour would decrease by 6.7 per cent but unskilled labour would decrease by 9.0 per cent. The enforcement of social security can have a lower effect on skilled labour than unskilled labour because social security contributions increase total savings and investment, where new capital requires more skilled labour than unskilled labour. Therefore, skilled labour is less affected than unskilled labour by the social security's negative effect in the short run.

Total investment is the only macroeconomic indicator that is positively affected by the enforcement of the Social Security Law. Social security contributions from employees and employers are simply added to savings and transformed into investment. The Supporting Information that accompanies this article shows that the response of investment to the enforcement of the Social Security Law is higher with a shorter payment period for the severance benefit. Although a higher level of payment of severance is supposed to increase both savings and consumption in the short run, the net effect on consumption is clearly negative due to a greater negative effect from the decrease in labour demand. The large increase in investment can be justified by the fact that a higher level of severance pay received by households is added to total savings and invested directly back into the economy.

The least harmful options to the economy in the short run are to delay the severance payments to the time of exiting from the job or to pay severance over the longest duration (see Tables A4a–A4e, in the online Supporting Information).

In Gaza, the compliance rate is lower than in the West Bank in all sectors. Thus, the positive change for savings accumulation and for investment is lower than in the West Bank. Thus, in the long run, the positive effect on GDP, consumption, foreign trade and employment is lower in Gaza (see Table A5, in the online Supporting Information). Moreover, the negative effect in the short run is lower in Gaza due to lower compliance rates, implying lower coverage under the Social Security Law.

Enforcement of social security with investment targets. Based on the elasticity of value-added to investment (see Table A1, in the online Supporting Information), we assumed that 35–50 per cent of social security contributions are directed to

four specific sectors (manufacturing, trade, transportation, and communication). Although the share of social security savings directed to investment is based on an actuarial study of the market, we are interested in estimating the effect of different investment strategies on the economy.

To offset the negative short-run effect of enforcing the Social Security Law, we found that at least 35 per cent of social security contributions must be invested in the above-mentioned four sectors. We consider this scenario with the least two harmful severance payment options: payment upon exit from the job, and payment over a 7-year period. When maintaining the payment of severance upon exit from the job, the enforcement of the Social Security Law has little effect on GDP, foreign trade, consumption and labour demand. Similar to the data shown in the online Appendix (see Tables A4a–A4e, in the online Supporting Information), for the payment of severance over seven years (see Table A6b in the online Supporting Information), the negative effect on GDP is present, but at a lower scale than would be the case without an investment strategy. With the option of leaving the payment of severance until exit from the job and with an investment plan in the four sectors, the negative effect on GDP is offset (see Table A6a, in the online Supporting Information).

Increasing the share of contributions to be assigned to investment in the four sectors to 50 per cent would imply better results (see Tables A7a–A7b, in the online Supporting Information), with 0.3 per cent growth in GDP relative to the baseline scenario. Alzua and Ruffo (2011) found that an investment-based scheme in physical capital can increase wages and consumption with lower unemployment and poverty rates. The consumption change relative to the baseline scenario is negative, but with lower change under the 50 per cent investment strategy.

Scenario 2

The smooth increase in the compliance rate over the years 2020–2024 associated with investment strategies based on 35 per cent or 50 per cent of social security contributions would increase the positive long-run effect more than in the first scenario (see Tables A8a–A8b, in the online Supporting Information). Increasing the investment share of social security contributions would only have a positive effect in the short run but would not significantly change the long-run effect.

Scenario 3

The compliance of all private-sector employees with the Social Security Law would be a large shock to the economy. The amount of contributions transformed into

investment is much higher than in the previous scenarios. Also, consumption would also be expected to decrease at higher rates than for the previous scenarios. Employment and GDP will also be largely negatively affected.

In the long run, the effect of enforcing the Social Security Law is larger than in the previous scenarios. It represents an opportunity for the economy of the State of Palestine to grow more than 32 per cent above the baseline scenario if all contributions are transformed into investment.

In a first step, we assume total compliance with the Social Security Law but without compliance with the minimum wage. This is not the case under the Social Security Law, but this is done to assess the impact of compliance with the minimum wage in sustaining consumption, which is negatively affected by deductions from wages to finance social security contributions. The data that accompanies this article (see Table A9, in the online Supporting Information) shows that consumption is largely affected by this shock, with a decline by 4.3 per cent in the short run. The effect of the large increase in investment is not sufficient to compensate the negative effect of contribution payment. Full compliance with social security negatively affects private employment and GDP.

Enforcement of the minimum wage in line with the Social Security Law will, on the one hand, increase the cost of labour. On the other hand, there will be an increase in the average wage. As shown by the data (see Tables A10a–A10b in the online Supporting Information), the decline in consumption, GDP and employment is lower than the decline without the enforcement of the minimum wage. The increase in the overall average wage by 3.4 per cent (0.4–6.6 per cent depending on the sector) is an additional cost of labour which causes a decline in labour demand. However, the rise in consumption compensates this decline and make the results for full compliance slightly better than without minimum wage enforcement.

The payment of severance in the case of full compliance implies payment to all private-sector employees. Even if the severance payment is assumed to be scheduled over a 7-year period, it represents an ample shock since all wages in all sectors will increase by 8.7 per cent due to the severance payments, in addition to the wage increase owing to the enforcement of the minimum wage. As a result, the indicators of consumption, employment, government expenditure and GDP will be negatively affected.

As for the previous scenarios, to reduce the negative effect of enforcing the Social Security Law in the short run, the investment of social security contributions must be directed to the four productive sectors (manufacturing, trade, transportation, communication and information). With an investment plan for 35 per cent of contributions and with payment of severance upon exit from the job, the negative effect is still most evident on consumption and labour demand (see Table A11a, in the online Supporting Information). To eliminate

the negative effect on GDP in the short run, at least 50 per cent of contributions must be directed to investment in the productive sectors and severance payment delayed until exit from the job (see Table A11b, in the online Supporting Information).

Conclusions

Overall, the simulations show similar results to those found in the literature. Negative effects on the key macroeconomic variables are found in the short run due to the payment of contributions by employers and employees. Nevertheless, positive effects are found in the long run, given that all contributions are accumulated and transformed into physical capital. This would result in higher productivity, employment, consumption, and a lower foreign trade deficit. The long-run positive effect occurs under the assumption that the financial institutions are suitably efficient to transform all savings into investment. This is the key assumption that generates growth in the long run.

The payment of severance for all previous years of work within the enterprise upon the enforcement of the Social Security Law causes negative outcomes for the economy. The most negative outcomes result when the duration of the period for payment instalments is shorter. As a starting point, the enforcement of the social security system on those enterprises currently complying with the severance payment system according to the Labour Law, with the payment of severance over a 7-year period, is the least harmful option.

The scenario of the gradual roll out of the social security system over a 5-year period, starting with the enterprises currently complying with the severance payment system (covering 31.1 per cent of private-sector employees) to attain 53.7 per cent, shows the same negative effect in the short run. The positive effect on GDP is, however, twice that of the weak compliance scenario. Pooling social security contributions in a social security fund and mandating financial institutions with the role to transform these into investments may imply positive effects in the long run if the financial institutions are efficient and have a high credit-to-deposit ratio. This is not the case in the State of Palestine, where the ratio of private-sector credit to deposits was around 58 per cent in 2018. PSSC investment strategies that target investment to productive sectors, with high elasticity of value-added to investment, may reduce the negative short-run effect. In the first scenario, with the lowest level of compliance, at least 35 per cent of social security contributions must be directed to investments in new capital in the four economic sectors of manufacturing, trade, transportation, communication and information, to eliminate the short-run negative effect on GDP growth.

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Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Work histories and workers' failure to satisfy pension contribution requirements: A comparison of Mexico and Uruguay

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Abstract Comparing Mexico and Uruguay, this article examines the work history of workers and the challenges they face to satisfy the minimum contribution period for eligibility to receive a contributory old-age pension. Administrative data on work histories is used to formulate a survival model aimed at estimating hazard rates of entering and transitioning out of a given contribution status. This model is then used to perform a Monte Carlo simulation to forecast contribution histories. Results suggest that the hazard rate is negatively associated with the length of a worker's spell in his or her current status and warn that, both in Mexico and Uruguay, a significant group of workers will find it difficult to gain entitlement to a contributory pension in old age. The manner in which each of these national systems has addressed the challenges associated with low contribution densities may explain the two countries' very different coverage results.

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Introduction

This article uses administrative records of work histories to analyse the density of contributions paid to the social security systems of Mexico and Uruguay. These two countries have been chosen because they represent two very different examples of social security coverage, as shown by household survey data.

Coverage by the old-age pension system in Mexico is low. According to the National Survey of Household Income and Expenditure, in 2018 only 37.5 per cent of all salaried workers contributed to social security, and only 27 per cent of those aged 65+ received a pension from the contributory system. To explain the low effective coverage rate in Mexico, eligibility for an old-age pension requires a minimum number of years of contributions.[1] However, the work histories of most workers in Mexico include extended periods of informal work, unemployment, or inactivity, causing many to be unable to satisfy this contributory requirement.

In terms of the low coverage by the contributory pension system, Mexico is not an isolated case in Latin America and the Caribbean. In Ecuador and Nicaragua, the proportion of adults aged 65+ who received a pension from the contributory system only slightly exceeded 30 per cent in 2019. For the same year, in Colombia and Peru, this proportion was below 30 per cent, while in the Dominican Republic, El Salvador, Guatemala, Honduras and Paraguay the rate of contributory coverage was below 20 per cent (Álvarez et al., 2020). We do not seek to imply that the results presented in this article concerning Mexico can be directly extrapolated to the set of countries in the region with low coverage by the contributory pension system. However, there may be significant similarities regarding the coverage challenges identified.

In contrast, there is wide contributory coverage under Uruguay's social security system. In 2019, approximately 75 per cent of workers contributed to social security and just over 80 per cent of the population aged 65+ received a contributory pension from a social security agency, a particularly high rate for the Latin American region. Furthermore, the amount of the benefit is adequate, at least in relation to average earnings in Uruguay. In recent years, the average pension benefit has been around 65 per cent of the average salary. The case of Uruguay is not wholly atypical for the region. Indeed, other countries of the

1. This is the case for most pension systems in the Latin America and the Caribbean region.

Southern Cone (Argentina, Brazil and Chile) are also characterized by relatively high levels of contributory coverage, where the proportion of those aged 65+ who have a contributory pension tends to be between 70 per cent and 90 per cent.

Based on information provided by household surveys, future pension coverage can be quantified as the percentage of the population economically active, employed or salaried, that contributes to the social security system.[2] While household surveys constitute a very rich source of data, the information they provide is cross-sectional data. These surveys fail to capture information about the number of contributions made over the course of a worker's employment life (i.e., contribution density), which determines benefit eligibility.

Recent studies have shown that pension system coverage is low not only because many people never contribute, but because many others contribute only for part of their work history. Based on panel data, generally sourced from social security administrative records, studies have shown that, in some Latin American countries, frequent interruptions in the contribution history as well as considerable non-contributory periods are relatively common (Herrerías and Zamarripa, 2017; Apella, 2010; Forteza et al., 2009, Álvarez et al., 2020). Analysis of how workers transit between contribution statuses (i.e., contributing or not contributing), which has important implications for the public policy debate, has helped provide a deeper understanding of pension system coverage in developing countries.

However, the policy implications of low levels of active pension system coverage may differ depending on whether workers' contributory behaviour to the system is regular and constant or transitory. Low national average coverage levels, as identified in household surveys, may be due to a segmented population, where one group of workers makes regular contributions, but another group makes none. Alternatively, this observed outcome might arise because a significant proportion of workers contribute only during part of their work history.

In the first scenario, it is to be expected that only those workers contributing to the pension system will receive a contributory pension. To ensure minimum protection, the others would require access to a social benefit. In the second scenario, there could be a greater proportion of workers who do not satisfy the contribution eligibility requirement. These workers would be without access to the contributory pension despite them having contributory records for determined periods. This scenario implies the need not only to provide a non-contributory old-age social benefit for those workers who do not satisfy the

2. Rofman and Oliveri (2011) provide extensive calculations of these indicators for several Latin American countries. Looking to the same data sources, other authors have estimated the likelihood of contributing to social security with multivariate logistic models (see for example, Apella and Casanova, 2008; Auerbach, Genoni and Pages, 2007; Li and Olivera, 2005; Barr and Packard, 2003).

contribution conditions but also to reflect on the question of the number of contribution periods that should be necessary to access the contributory benefit. This would suggest that there is more to this challenge than simply identifying the average number of contributions to the system. Also important is the question of how often workers transit between the status of contributing and not contributing.

The aim of this article is to estimate and describe the contribution density of workers enrolled in the Mexican Social Security Institute (*Instituto Mexicano del Seguro Social* – IMSS) and the State Employees' Social Security and Social Services Institute (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* – ISSSTE) in Mexico, and the Social Insurance Bank (*Banco de Previsión Social* – BPS) in Uruguay. We do so with regard to a period that spans from the first two-month period of 1997 to the sixth two-month period of 2018 for IMSS workers; from the first 2-month period of 2007 to the sixth 2-month period of 2018 for ISSSTE workers; and from April 1996 to December 2015 for BPS workers. To this end, the databases of administrative records from the three social security agencies were used. Additionally, the relationship between the hazard rate of transition from contributing to not contributing status, and vice versa, and some individual characteristics (such as sex, age, and income) are analysed. A survival model is formulated to model transitions between statuses. Based on estimated hazard rates and using Monte Carlo simulations, complete work histories are simulated for a hypothetical group of workers to estimate the likelihood of attaining 25 years of contributions at the minimum legal retirement age in both countries.

The results show that the differences in the traditional indicators of active coverage between the social security systems of Mexico and Uruguay are not extreme in terms of contribution density. The average contribution density of workers in Uruguay is 57 per cent, while in Mexico it is 41 per cent for workers in the private sector and 50 per cent for workers in the public sector. These average values hide, however, a great heterogeneity. Although the contribution density distribution in both countries reveals clusters at 0 per cent and 100, per cent, most workers are evenly distributed between these two extremes, suggesting that workers in both countries transit frequently between contributing and not contributing statuses.

These results are in line with a broad set of previous work analysing the issue of contribution density in Latin American countries. For countries characterized by high levels of coverage, the works of Bertranou and Sánchez (2003) for Argentina, Arenas de Mesa, Behrman and Bravo (2004) for Chile, Forteza et al. (2009) for Argentina, Chile, and Uruguay, and Chiliatto-Leite (2017) for Brazil have estimated, in all cases, contribution densities above 50 per cent but below 60 per cent. Regarding countries characterized by low levels of coverage, a

number of studies (Botello Peñaloza (2018) for Colombia; Herrerías and Zamarripa (2017) and Castañón and Ferreira (2017) for Mexico; Argueta, Bolaños Cámbara and Rivera (2015) for El Salvador; and OECD, IDB and World Bank (2014) for Peru) have systematically found lower contribution densities than in the first set of countries; on average, between 30 per cent and 50 per cent. Thus, the literature also indicates that the heterogeneities across Latin America in terms of contribution density seem to be comparatively minor in relation to the differences observed regarding contributory coverage.

Along the same lines, the results of this present study flag up, for both Mexico and Uruguay, that a significant group of workers will find it difficult to access a contributory pension at retirement. The main contribution of this article to the literature is to offer an analysis of two countries that present substantial differences in terms of pension coverage, but which have a similar problem associated with low contribution density.

The way in which each national system has addressed the problems associated with low contribution density could help explain the very different coverage results between the two countries. It is likely that rigid contributory requirements in a context of low contribution density generates very low contributory coverage in Mexico. The more flexible approach in Uruguay to the contributory requirements for old-age pensions (for instance, recognizing contributions through testimonial evidence or, indeed, the creation of less rigid requirements in 2008) probably explains that country's broader coverage. This, however, has been achieved at the risk of weakening the system's financial sustainability, given the underlying context of low contribution density.

This article is organized as follows. The next section provides a description of the origin and main characteristics of the pension systems in Mexico and Uruguay. We then describe the databases used in this analysis before presenting a descriptive analysis of contribution densities. Thereafter, we explain the methodology used to simulate work histories and to estimate the proportion of individuals who will have paid sufficient contributions to be eligible for social security old-age pension coverage at age 65. We then offer the main results of this research before setting out our conclusions.

The pension systems of Mexico and Uruguay

Mexico

The origin of the Mexican pension system dates to the early twentieth century. There was never a single scheme for the whole population, but rather a multiplicity of systems. Private-sector workers are enrolled in the IMSS, while a

number of different schemes are used for public-sector workers, including Federal civil servants (ISSSTE); workers for public companies such as *Petróleos de México* (PEMEX), *Comisión Federal de Electricidad* (CFE), and *Luz y Fuerza del Centro* (LyFC); workers at development banks, such as *Nacional Financiera* (NAFIN) and *Banco de Ahorro Nacional y Servicios Financieros* (BANSEFI); state and municipal workers (ISSSTE in various states); and even workers at public universities. In other words, the income-protection system for older adults in Mexico is made up of a group of dependent systems, each with its own set of operating rules.

The various pension schemes have traditionally used a pay-as-you-go financing mechanism, where workers, employers and the federal government contributed to a common fund that financed the defined benefit pensions for retired workers. In 1998, there were eight active workers for each social security recipient; that is, the contributions of eight workers financed the pension of one retiree.

According to Azuara et al. (2019), because of demographic changes, financial imbalance, and the economic crises Mexico experienced from 1976 to 1995, it became indispensable to reformulate how the main pension systems operated. From 1995 to 1997, a structural reform of the pension system for private-sector workers was carried out. The pay-as-you-go regime was replaced by a fully funded regime with benefits financed on a defined contribution basis. In this new framework, workers' social security contributions are deposited into individual accounts administered by private firms, the Retirement Funds Administrators (*Administradoras de Fondos para el Retiro* – AFORES). The AFORES invest the funds with the aim of earning the highest possible returns, to generate the basis for the pension income the beneficiary will receive during retirement.

A minimum retirement age (age 65) was established, as was the requirement for a minimum of 1,250 weeks of contributions to the system (approximately 25 years). Workers who had contributed at least once to the previous pay-as-you-go system were given the option to retire under the defined benefit system at age 60 and had the possibility of receiving up to 100 per cent of the last contribution salary, up to a ceiling equivalent to ten minimum salaries (this was later raised to 25 minimum salaries).[3]

In 2007, a similar structural reform was implemented for the pensions of civil servants enrolled in the ISSSTE; in 2008, the changes were implemented for CFE workers; in 2015, for PEMEX workers. In every case, the reforms entailed transitioning into a complete or partial defined contribution system, so that all the various pension schemes would finally operate in a single multi-pillar framework (Andrews, 2006).

3. In 2020, the Mexican pension law governing the IMSS was modified. The changes included a reduction in the number of contribution periods to 1,000 weeks.

The ISSSTE pension system reform led to the creation of the National Fund of Pensions for State Workers (PENSIONISSSTE), a public AFORE distinct from the ISSSTE. Pursuant to that reform, a recognition bond was deposited into the account of each worker. Starting in 2011, workers had the option of handing the administration of their individual accounts over to a private administrator or of leaving it with the PENSIONISSSTE. This reform made pension rights fully portable; a worker who worked in both the public and the private sector could contribute to a single individual account, and all workers could shift from the public to the private sector, or vice versa, without losing any benefits or rights. The minimum retirement age was changed for workers who decided to remain in the ISSSTE system. It rose from age 50 to age 58 for women and to age 60 for men, with biannual adjustments during a 20-year period. The pension was calculated as a percentage of the worker's basic salary; the amount would increase with length of service until reaching 95 per cent of that basic salary.

The construction of the old-age pension system has, historically, not treated the entire population equally. Over time, subsystems were created ad hoc for groups of workers. As a result, the current system is highly fragmented; different rules and benefits are in place for different sectors. In 2018, 73.4 per cent of Mexico's economically active population was in the informal sector, which means that only 26.6 per cent contributed to social security. Of those contributors, 80 per cent contributed to the IMSS and 20 per cent to a public-sector system, but most commonly the ISSSTE.

While there are over 60 million accounts registered in the Mexican fully funded defined contribution regime, only a small portion of all those enrolled contribute on a regular basis.

In 2020, seeking to increase the coverage of the pension system, Mexico reduced the number of years of contribution required to access a contributory pension from 25 years to 20 years. Additionally, access to non-contributory pensions was universalized.

Uruguay

The history of the Uruguayan pension system has witnessed several different stages of development. The first dates to the late nineteenth century, when the government granted disability benefits to combatants of the wars of independence or to their widows (survivor benefits), and extended pensions to civil servants.

In 1919, the Pension Scheme for Public Utilities Employees (*Caja de Jubilaciones y Pensiones de Empleados y Obreros de los Servicios Públicos*) was created. It encompassed those working for utility and public service companies (telegraph, railroad, trolley car, telephone, water, and gas workers).

By 1954, most private-sector workers were included in the pension system. At that point, Law No. 12,138 was enacted, bringing all persons who performed a formal and paid activity and were not covered by other pension systems into the insurance regime administered by the Pension Scheme for Industrial and Commerce Employees (*Caja de Jubilaciones y Pensiones de Industria y Comercio*).

As the system matured, the regimes began to generate deficits and had to resort to general revenues. As early as the 1960s, the system's crisis became palpable, due not only to population ageing but also to inefficiencies in the coordination of employment sectors, the unreasonable expansion of new benefits, and the haphazard management of the accumulated financial resources.

In 1967, the Social Insurance Bank (*Banco de Previsión Social* – BPS) was created as an autonomous institution, administered and funded independently from the central government. The BPS merged the various regimes and set out to unify eligibility criteria and benefit amounts. Notwithstanding, the pension system continued to yield financial deficits, which led to a structural reform similar to that being enacted at the time in a number of the region's countries.

In 1995, Law No. 16,713 was adopted, creating a mixed retirement system with two pillars: a pay-as-you-go regime administered by the BPS and a fully funded scheme administered by Pension Savings Fund Administrators (*Administradora de fondos de ahorro previsional* – AFAP). Along with the structural reform, parametric changes were implemented, among them the unification of the retirement age for men and women at age 60 and an increase in the required years of contribution from 30 years to 35 years. These parametric reforms restricted access to the benefit.

Together with the new law, the mechanism for compliance with the conditions of access to contributory pensions was also modified, shifting from permitting the testimony of third parties as a way of proving contributions made in the past by beneficiaries to demanding those contributions to be registered in a social security institute. In this manner, the law created the work histories of social security affiliates,[4] a move that would come to limit the discretion regarding the recognition of years of contributions that existed up to that time (and which still exists for years prior to 1996).

Since that reform, the Uruguayan pension system has been, as stated, a mixed, two-pillar system: a pay-as-you-go component, based on intergenerational solidarity, which is funded by contributions paid from salaries and other taxes, as well as financial support from the central government; and a fully funded scheme, where obligatory savings are deposited into individual accounts through direct contributions.

All workers, regardless of income level, contribute to the BPS, except those who contribute to some specific sectorial systems (*Caja Notarial de Seguridad Social*;

4. See Filgueira and Moraes (2001) for more details.

Caja de Jubilaciones y Pensiones Bancaria (Bank Employees' Pension Fund – CJBP); *Caja de Profesionales Universitarios del Uruguay*), and police and military personnel retirement funds. Once a worker is enrolled in the BPS, the requirement to enrol in an AFAP depends on his or her labour income. Law No. 16,713 establishes that any worker with an income greater than 62,804 Uruguayan pesos (UYU) (in January 2020) is required to enrol in an AFAP and thereby to participate in the fully funded scheme. For workers earning less than that amount, enrolment with an AFAP is not mandatory, though Article 8 of the Law provides the option to do so.

The funds accumulated in individual accounts are administered by the AFAP. There are currently four active AFAPs, of which three are private institutions and one is public. The AFAPs administer the pension funds and are responsible for their rate of return. For these services, workers are charged a commission.

The pension system is funded by several sources: workers' contributions (15 per cent of their salaries), employers' contributions (7.5 per cent of a worker's salary), and the State through taxes designed to fund social security coverage and subsidies to offset the BPS's financial imbalance. According to official data from the BPS, general revenues cover 50 per cent of all BPS pension payments. The pensions derived from individual capitalization are funded solely by contributors' deposits and the returns accrued.

In 2008, with the objective of avoiding a reduction in contributory coverage, several modifications made the eligibility requirements for contributory pensions more flexible. The number of contribution years required to retire and receive a pension was reduced from 35 years to 30 years, while the minimum retirement age (age 60) was left unaltered. Also, a benefit for older workers was introduced, whereby workers aged 70 or older who do not meet pension eligibility requirements may now receive a pension. Under this new system, adults aged 70 or older must have contributed for a minimum of 15 years. This modification also created a progressive scale by which people younger than age 70 can retire if they meet the following years-of-service thresholds: age 69 and 17 years of service; age 68 and 19 years of service; age 67 and 21 years of service; age 66 and 23 years of service; and age 65 and 25 years of service.

Data

Mexico

The source of information for Mexico is the administrative micro-database of work histories of the IMSS and ISSSTE, from the National Database for the Retirement Savings System (BDNSAR). The pension system administered by the IMSS

encompasses all private-sector formal workers, while the system administered by the ISSSTE encompasses federal civil servants.

The IMSS database of work histories includes the universe of individuals enrolled in an AFORE, that is, some 60.7 million people. It contains information on workers' contributions to the pension system every two months. The period studied here spans from the first two months of 1997 to the last two months of 2018. The ISSSTE database of work histories covers the period that spans from the first two months of 2008 to the last two months of 2018; the total number of individuals enrolled in the database is 4.5 million.

Both databases include persons born from 1920 to, approximately, the year 2000. The few individuals born after 2000 included in the database were excluded from this analysis. While in the IMSS database, the largest cohorts are those born between 1970 and 1990, the composition of the ISSSTE's database is more uniform, with a large population born before 1960.[5]

Owing to the volume of the databases for Mexico, we used a sample obtained by simple random sampling for each case. Each individual was assigned a random value in a uniform distribution. Individuals were then arranged based on that value, and those with the lowest values were selected. Regarding participants in the IMSS, 1 per cent of the total population was selected as the sample (670,000 cases), while for the ISSSTE, the sample was 5 per cent of the total population (225,000 cases). The estimation process was then repeated 100 times to confirm that there were no significant differences between the two samples in terms of contribution density or the average values of variables such as sex, age, and last declared labour income.

Uruguay

The source for Uruguay is the administrative micro-database of work histories of the BPS, which encompasses the bulk of formal workers in both the private and public sectors.

The BPS database for Uruguay contains information about contributors from the private and public sectors born from 1955 to 1976, meaning their ages range from ages 20–60. The largest cohort consists of those born after 1970. The individuals in the records are those who contributed at least once between April 1996 and December 2015. Our study considers almost 35 million monthly observations in panel format.

For the IMSS, ISSSTE and BPS databases, the work history data include information on labour income for each contribution period. This information

5. This article is supplemented by an online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix A, Figure A1 and Table A1.

shows the periods during which individuals contributed to the respective system. It also provides precise information about when each contribution or non-contribution spell began and ended for each worker. Additional information available in these databases includes contributors' sex, date of birth, date of first contribution, and date of retirement, among other data.

Contribution density

The definition of contribution density used in this study is the ratio of the number of contribution periods for a worker divided by the total number of periods in which she or he is exposed to the contribution (exposure period).

The definition of the contribution exposure period is problematic due to the heterogeneity of individuals.[6] Following earlier works (Apella, 2010; Forteza et al., 2009), the contribution exposure period is defined as the period that spans from age 18 to age 65 (or the age of retirement if it occurs sooner). Robustness tests were performed, showing that the results presented here are almost identical when other definitions of potential contribution period are used. The contribution density indicator is defined as follows:

$$DC = \frac{Contribution\ periods}{Contribution\ exposure}$$

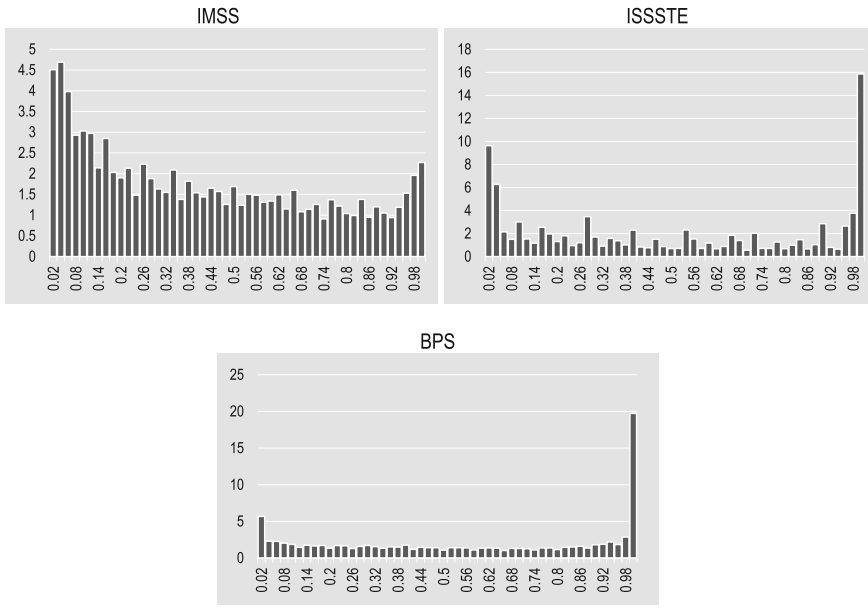
Based on this definition, it is estimated that the density of contributions to the pension system administered by the IMSS and the ISSSTE in Mexico is, on average, equal to 41 per cent and 50 per cent, respectively. In Uruguay, the estimated average contribution density for workers enrolled in the BPS during the period under analysis is 57 per cent.[7]

In none of the analysed cases is the distribution of contribution density entirely bimodal, even though there are high concentrations at values near zero and one. These results suggest that in neither of the countries, the coverage problem is discrete; that is, it is not a question of those who contribute and those who do not. Rather, the problem is due to a lack of continuity, where workers make

6. By way of example, individuals with fewer years of formal education are likely to enter the labour market sooner, which means that their potential contribution period begins sooner. As a result, choosing a very low potential age of entry into the labour market skews the contribution away from more educated workers and toward the less educated. One possible solution to this would be to consider that an individual's potential contribution period begins with her or his first contribution. That solution tends to overestimate the contribution density of individuals whose late entry into the formal labour market was preceded by activity in the informal sector.

7. The results for Uruguay align with the results reported in earlier studies; see Bucheli, Forteza and Rossi (2006) and Forteza et al. (2009).

Figure 1. *Contribution density distribution for the IMSS, ISSSTE and BPS.*



Source: Authors' elaboration based on BDNSAR and BPS data.

contributions, but these are not sufficient to satisfy the required minimum (Figure 1).

There are similarities but also differences in the contribution densities of workers enrolled in the three institutions: see IMSS (Table 1) and ISSSTE (Table 2) in Mexico, and BPS (Table 3) in Uruguay. While among participants in the IMSS, the average density of contributions for men is greater than the average density for women (0.44 versus 0.36), among those enrolled in the ISSSTE the difference by sex is insignificant (density for women is 0.51 and for men 0.49). In the case of Uruguay's BPS, as in the case of Mexico's IMSS, the gender gap favours men in both average and median contribution density. Men's average contribution density is 59 per cent, whereas for women it is 55 per cent.

In all cases, the contribution density of young workers is lower than for their older counterparts, and density increases with income level.

Estimation methodology

This section presents the methodology used to estimate the proportion of workers who would manage to make contributions for the number of periods required to

Table 1. *IMSS: Contribution density*

Traits	Average	Mean	% of contributors with contribution densities (d)				
			d<25%	25%≤ d<50%	50%≤ d<75%	75%≤ d<100%	d= 100%
Total	**0.41**	0.35	45.68	20.39	16.85	14.88	2.21
Sex							
Men	0.44	0.39	41.64	20.15	18.05	17.64	2.51
Women	0.36	0.29	51.64	20.74	15.07	10.79	1.76
Income quintile							
I	0.16	0.09	80.36	14.05	4.67	0.92	0.00
II	0.35	0.28	47.83	24.40	16.65	10.00	1.12
III	0.36	0.30	45.56	25.31	17.42	10.62	1.09
IV	0.49	0.48	27.35	25.16	24.04	20.95	2.50
V	0.65	0.69	12.17	18.69	26.14	36.04	6.95
Age							
18–24	0.35	0.28	47.49	18.82	16.91	12.29	4.49
25–34	0.43	0.35	42.93	14.20	13.60	18.20	11.08
35–44	0.40	0.27	48.48	11.14	10.50	15.46	14.43
45–54	0.41	0.27	48.56	10.30	9.59	13.97	17.58
55–64	0.37	0.23	50.57	11.97	13.48	10.34	13.64
65+	0.18	0.00	76.22	8.03	5.27	4.05	6.43

Source: Authors' elaboration based on BDNSAR and BPS data.

receive a pension upon retirement. We also identify the most vulnerable groups, those least likely to receive a pension.

The proportion of workers who would be eligible cannot be calculated directly. This is because – among other things – conditions for eligibility change over time and work history records are incomplete. With incomplete work histories, estimating how many years of contribution workers have accumulated when they reach retirement age is difficult. For that reason, a two-phase methodology is developed to estimate the distribution function of the number of contribution years completed over a lifetime. During the first phase, transition indexes (or hazard rates) for transition from contributing to not contributing status are estimated. During the second phase, work histories are simulated using the estimated hazard rates. The distribution functions of the number of contribution periods reached are calculated at different ages.

Table 2. *ISSTE: Contribution density*

Traits	Average	Mean	% of contributors with contribution densities (d)				
			d<25%	25%≤ d<50%	50%≤ d<75%	75%≤ d<100%	d= 100%
Total	**0.50**	0.47	33.81	17.54	15.23	17.56	15.86
Sex							
Men	0.49	0.44	34.30	18.51	14.83	16.67	15.68
Women	0.51	0.48	33.37	16.67	15.59	18.35	16.01
Income quintile							
I	0.22	0.09	69.35	14.60	7.78	6.41	1.86
II	0.42	0.32	40.84	21.74	14.88	12.48	10.05
III	0.58	0.56	21.80	22.23	18.19	20.78	17.00
IV	0.63	0.68	18.25	18.21	17.54	25.05	20.96
V	0.71	0.85	12.70	12.55	19.19	24.70	30.86
Age							
18–24	0.15	0.00	78.66	10.96	4.99	2.08	3.31
25–34	0.47	0.42	40.36	13.13	11.70	13.53	21.28
35–44	0.61	0.83	29.20	8.88	8.67	14.17	39.08
45–54	0.66	0.89	23.27	9.30	10.23	16.11	41.10
55–64	0.47	0.39	43.50	9.79	8.70	11.28	26.74
65+	0.33	0.00	60.37	7.26	5.14	6.53	20.70

Source: Authors' elaboration based on BDNSAR and BPS data.

First phase: Hazard rate estimation

Work histories are assumed to begin when workers are aged 18. There are two possible statuses for workers: they either make a monthly contribution to the pension system at month *j*, in which case they are formally employed; or they do not make contributions, in which case they may be informally employed, unemployed or inactive. In the course of their work histories, the status of workers may change in many respects, but we focus on two statuses in relation to one variable: contributing or not contributing to the pension system. The likelihood of changing status (based on whichever applies to the worker: contributing or not contributing) in the interval (a_{j-1}, a_j) is defined as:

$$prob(a_{j-1} < T \leq a_j) = F(a_j) - F(a_{j-1}) = S(a_{j-1}) - S(a_j) \qquad (1)$$

Table 3. *BPS: Contribution density*

Traits	Average	Mean	% of contributors with contribution densities (d)				
			d<25%	25%≤ d<50%	50%≤ d<75%	75%≤ d<100%	d= 100%
Total	**0.57**	0.59	25.49	18.34	15.96	23.13	17.09
Sex							
Men	0.59	0.64	23.86	17.05	16.34	25.24	17.51
Women	0.55	0.54	27.32	19.79	15.54	20.73	16.61
Income quintile							
I	0.34	0.22	53.83	18.64	10.94	12.79	3.79
II	0.45	0.41	32.58	26.58	19.81	16.41	4.63
III	0.64	0.70	14.51	17.75	23.30	33.64	10.79
IV	0.80	0.94	7.73	8.65	11.88	38.46	33.28
V	0.78	1.00	13.39	10.70	4.11	13.91	57.89
Age							
20–29	0.49	0.48	38.80	12.45	12.24	15.28	21.23
30–39	0.56	0.63	32.64	11.49	11.20	16.18	28.49
40–49	0.62	0.81	28.34	9.52	9.28	13.63	39.22
50–60	0.67	1.00	25.68	6.38	6.73	10.89	50.32

Source: Authors' elaboration based on BPS data.

Where $F(.)$ is the accumulated distribution function or the *failure function*, and $S(.) = 1 - F(.)$ is the survival function.

Following Jenkins (2005), the likelihood of changing status in the interval a_j, the worker having held that status until a_{j-1}, is known as the hazard rate and defined as:

$$h(a_j) = prob(a_{j-1} < T \leq a_j || T > a_{j-1})$$

$$h(a_j) = \frac{prob(a_{j-1} < T \leq a_j)}{prob(T > a_{j-1})} \quad (2)$$

$$h(a_j) = \frac{S(a_{j-1}) - S(a_j)}{S(a_{j-1})} = 1 - \frac{S(a_j)}{S(a_{j-1})}$$

Hence, the likelihood of surviving until a determined period j is the product of the likelihood of not undergoing a change in status in each previous interval (or of surviving each previous interval). Therefore:

$$S(j) = \prod_{j=1}^{j=k}(1 - h_k) \tag{3}$$

In turn, the failure function is represented by:

$$F(j) = 1 - S(j) \tag{4}$$

The likelihood of changing status in the interval j is:

$$f_j = S_{j-1} - S_j$$

Operating on this expression, we get:

$$f_j = \left(\frac{h_j}{1 - h_j}\right)\prod_{j=1}^{j=k}(1 - h_k) \tag{5}$$

When considering a worker with one of the two possible statuses (contributing or not contributing), the worker can change from one status to the other depending on certain circumstances.

In this sense, we define $h_c(t, X_t)$ as the likelihood that a worker who is contributing to the social security system in the period t ceases to do so in $t+1$, and $h_n(t, X_t)$ is the likelihood that a worker who is not contributing in t begins to do so in $t+1$. Those probabilities are called transition rates or hazard rates during a discrete period for the contributing or not contributing status. Those hazard rates depend on a set of variable traits represented by X_{it}.

It is usually assumed that the hazard rate can be decomposed into two different components: the base hazard function γ_t, which captures the impact of length on contribution status, and a component that accounts for the impact of traits X_{it}. This model is called the Proportional Hazard Model because, in the cases of two individuals who differ solely in their time-invariable traits, the ratio is constant and proportional to the absolute difference in those traits. The hazard rate depends on non-observable individual effects u_i.

If h_{it} is defined as the rate of transition from one status to another, the likelihood of that status remaining the same until period T is determined by:

$$\Gamma(u_i) = \begin{cases} \prod_{t=1}^{T_i}(1 - h_{it}) & \text{if there is no change in status} \\ \left[\frac{h_{iT_i}}{1 - h_{iT_i}}\right]\prod_{t=1}^{T_i}(1 - h_{it}) & \text{if there is a change in status} \end{cases}$$

Let $y_{it} = 1$ if the individual's status changes in period t, and $y_{it} = 0$ in any other case, then no change in status can be formulated as:

$$\Gamma(u_i) = \left[\frac{h_{iT_i}}{1 - h_{iT_i}}\right]^{y_{iT_i}} \prod_{T_i}^{t=1}(1 - h_{it}) \tag{6}$$

Assuming that u_i is normally distributed with the average of zero and σ_u^2, the total probability is:

$$\Gamma = \int_{-\infty}^{\infty} \frac{e^{-u_i^2/2\sigma_u^2}}{\sqrt{2\pi}\sigma_u}\Gamma(u_i)du_i$$

This can be understood as a latent variable model where $y_{it} \in (0, 1)$ is equal to 1 if and only if $e_{it} < x_{it}'\beta^D + \gamma_t + u_i$ is distributed according to a Gumbel distribution (0.1); that is, the accumulated distribution function is $D(e_{it}) = 1 - exp(-exp(e_{it}))$. In a discrete-time context, which is the assumption of our data here, the hazard rate satisfies the assumption of proportional risk and can be expressed as:

$$\begin{aligned} h_{it} &= Pr(y_{it} = 1) = Pr(e_{it} < x_{it}'\beta + \gamma_t + u_i) \\ &= 1 - exp(-exp(x_{it}'\beta + \gamma_t + u_i)) \end{aligned} \tag{7}$$

where γ_t is the base hazard function (Jenkins, 2005). This model is known as the complementary log-log model due to the application of a complementary log-log transformation to the hazard rate. It is possible, hence, to express the hazard rate as a linear function of the base hazard function and the vector X_{it}:

$$log[-log(1 - h(t, X_t))] = x_{it}'\beta + \gamma_t + u_i \tag{8}$$

To identify γ_t, some additional assumptions must be imposed on the underlying functional form. In the absence of a specific theoretical argument, we adopt the common practice of using dummy variables to represent length and age. Once empirical patterns of length and age can be identified, however, a more parsimonious functional form is chosen to facilitate simulations. In this regard, it is decided to use a second-degree polynomial in age and the length logarithm.

Since the impact of age can vary over the life cycle, two interaction variables between length and individual age are included.

Additionally, the data window has censoring and truncation problems, multiple spells, unobservable heterogeneity, and a survey period. A contribution spell is expected to come to an end when a worker transitions from the contributing to not contributing status, but it can also end because the observation period ends. If that is the case, all we know is that the worker's status did not change before the end of the observation period; we do not know if the worker's status changed later.

That right-censored data is not a problem for the measurement of hazard rates. In the dataset used, right-censored data occurs in two cases. First, the observations are censored at the extreme of the work history sample. Second, a worker may die or retire during the observation period. Death and retirement could be seen as different statuses in the context of a risk competition model.

Left-censored data happens when the date at which the status begins is not observed. In this case, spells in either status are left-censored in relation to the contribution that began before the first two months of 1997 for the IMSS, the first two months of 2007 for the ISSSTE, and before April 1996 for the BPS. For that reason, those spells are not used in our estimations.

Truncation on the left occurs when the individual is first observed after he or she has a contribution status. This type of problem can arise in the data window used. The database of work histories captures all the workers who contributed for at least one 2-month period between the first two months of 1997 and the final two months of 2018 in the case of the IMSS, between the first two months of 2007 and the last two months of 2018 in the case of the ISSSTE, and between April 1996 and December 2015 in the case of the BPS.

This unobserved heterogeneity can bias estimations. To reduce, at least in part, the effects of unobservable traits, hazard rates are estimated separately according to the sex of workers whose behaviour is potentially different.

Second stage: Simulation of employment histories

The construction of the empirical distribution function of the number of contribution periods at retirement age is analytically viable if the likelihood of contributing in each period is independent of the previous status (Bucheli, Forteza and Rossi, 2010). However, that function cannot be constructed when contribution likelihood depends on the previous state and varies over the life cycle. In that case, work histories are determined by a non-homogeneous Markov chain. Monte Carlo simulations are performed to overcome that difficulty.

The simulation of work histories requires the construction of a sequence "c" or "n", for the contributing status and not contributing status, respectively, that adequately replicates the stochastic properties of the incomplete histories observed.

First, the hazard rate for the contributing or not contributing status is simulated using the estimated complementary log–log model. It is assumed that individual effects are the result of a normal distribution with an average of zero and a previously estimated standard deviation ($SD(u_i)$):

$$\widetilde{u}_i = SD(u_i).\widetilde{z}; \qquad \widetilde{z}\sim \text{Normal}(0,\ 1)$$

Next, Monte Carlo simulations are run with the following hazard rates:

$$log\left(-log\left(1\ -\ \widetilde{h}_{it}\right)\right) = x_{it}'\,\widehat{\beta} + \widetilde{\gamma}_t + \widetilde{u}_i \tag{9}$$

The simulated worker who contributes in t contributed in the period $t\ -\ 1$ and did not transition into the not contributing status or did not contribute in $t\ -\ 1$ and did transition into the contributing status.

p designates the likelihood of changing status; it is assumed that that likelihood is based on an even distribution during the spell $[0,\ 1]$.

The individual contributes in t if $p \geq \widetilde{h}^{C}_{it\ -\ 1}$ and he or she was contributing in $t\ -\ 1$, or if $p \leq \widetilde{h}^{N}_{it\ -\ 1}$ and he or she was not contributing in $t\ -\ 1$. With that rule, the likelihood that a person who contributes in $t\ -\ 1$ also contributes in t is $1\ -\ \widetilde{h}^{C}_{it\ -\ 1}$, which is the likelihood of not transitioning into the not contributing status.

The likelihood that an individual who does not contribute in $t\ -\ 1$ contributes in t is $\widetilde{h}^{N}_{it\ -\ 1}$, which is the likelihood of transitioning out of the not contributing status. The algorithm presented was applied to the work history of each simulated individual. The simulations begin at age 18 with a not contributing status and ends at age 70. The number of contribution months accumulated at any age can be counted in each of the simulated work histories. Repeating this procedure 5,000 times yields empirical distributions of the number of contribution months at the mentioned ages.

Econometric results

In this section, the results of the estimations yielded by equation eight (8) for each of the systems considered are presented; that is, the hazard rate of a change in status (contributing or not contributing) for men and women. The incorporated regressors are the natural logarithm of the length of the spell (expressed in 2-month periods for Mexico and in monthly periods for Uruguay), during which the worker's status does not change, and their interaction with two dummy

variables: the first taking a value of one if the person is aged 30–50 and the second taking a value of one for those older than age 50. The aim of those interactions is to identify any differential effect of length on the likelihood of changing status. Age and its square are also considered. All these regressors vary, not only from one individual to another but also over time.

To consider the effect of macroeconomic context on changes in status, the unemployment rate is used; it varies over time but not among individuals. Finally, the natural income logarithm is incorporated. The value of these variables is the last data surveyed for each worker, which means they do not vary over time and the impact they capture is partial.[8]

The results found for workers enrolled in the IMSS are expressed in Table 4. There is a moderate regression adjustment for this group of workers, with an average of 67 per cent correct predictions for the risk of transitioning out of contributing status and 60 per cent for transitioning out of not contributing status for men and women.

The length of the spell is significant, at 1 per cent; the expected negative sign holds true in all cases. This result suggests that the longer a worker remains in a certain status, the less likely that status is to change. The length effect is greater for older groups of workers. In this sense, the natural logarithm for the length of the spell on persons aged 30–50 and on persons older than age 50 is significant and negative, and greater in absolute terms in the case of the former.

At the same time, the older the workers become, the more likely they are to hold a formal job, although that tendency only holds true for as long as the individual is in her or his years of greatest productivity. Once workers are older than age 50, their probability of having a formal job decreases. Indeed, age is significant in the model, and it has a negative and decreasing effect on the likelihood of transitioning out of contribution status. On the contrary, age has a positive and decreasing effect on the likelihood of transitioning from not contributing into contributing status. Individuals with higher levels of income,[9] regardless of sex, are less/more likely to transition out of the contributing/not contributing status.

Concerning the results of the estimation of the transition rate for ISSSTE affiliates (Table 4), again there is a moderate regression adjustment, with an average of 68 per cent correct predictions for the risk of transitioning out of contributing status and a little above 60 per cent for transitioning out of not contributing status for both sexes.

8. We decided to take the value of the last reported income because, during spells of not contributing, no income is reported for a worker. Nonetheless, that value does capture the structural heterogeneity between individuals regarding, for instance, education level, without diminishing explanatory power.
9. Income level here refers to the last salary reported, which means it could be considered a proxy for education level.

Table 4. *Equation estimation (8): $h_{it} = 1 - exp\Big(- exp(x'_{it}\beta^D + \gamma_t + u_i)\Big)$ for IMSS, ISSTE and BPS*

	IMSS				ISSTE				BPS			
	Contributing		Not contributing		Contributing		Not contributing		Contributing		Not contributing	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
L length	-0.332***	-0.310***	-0.465***	-0.457***	-0.331***	-0.378***	-0.722***	-0.719***	-0.657***	-0.391***	-0.398***	-0.396***
	(0.0018)	(0.0024)	(0.0019)	(0.0023)	(0.0055)	(0.0047)	(0.0067)	(0.0058)	(0.0036)	(0.0048)	(0.0035)	(0.0051)
L length	-0.002***	-0.038***	-0.063***	-0.055***	0.063***	0.107***	0.109***	0.144***	0.060***	0.054***	-0.045***	0.009*
*e30-50	(0.0017)	(0.0023)	(0.0019)	(0.0023)	(0.0051)	(0.0045)	(0.0066)	(0.0057)	(0.0037)	(0.0047)	(0.0035)	(0.0050)
L length	-0.002***	-0.032***	-0.032***	-0.041***	0.067***	0.152***	0.149***	0.139***	0.164***	0.116***	0.045***	0.065***
*e50+	(0.00267)	(0.0039)	(0.0029)	(0.0041)	(0.0068)	(0.0064)	(0.0077)	(0.0069)	(0.0044)	(0.0055)	(0.0044)	(0.0058)
Age	-0.045***	-0.045***	0.026***	0.022***	-0.033***	-0.058***	0.041***	0.021***	-0.069***	-0.129***	0.002	-0.069***
	(0.0009)	(0.0013)	(0.0009)	(0.0013)	(0.0025)	(0.0026)	(0.0024)	(0.0025)	(0.0024)	(0.0038)	(0.0026)	(0.0040)
Age2	0.053***	0.050***	-0.053***	-0.042***	0.044***	0.064***	-0.060***	-0.043***	0.109***	0.184***	-0.005*	0.103***
	(0.0012)	(0.0017)	(0.0012)	(0.0018)	(0.0029)	(0.0032)	(0.0027)	(0.0028)	(0.0032)	(0.0048)	(0.0033)	(0.0051)
Lny	-0.484***	-0.475***	0.266***	0.352***	-0.289***	-0.344***	0.203***	0.267***	-0.402***	-0.223***	0.197***	0.301***
	(0.0023)	(0.0030)	(0.0022)	(0.0028)	(0.0040)	(0.0042)	(0.0036)	(0.0035)	(0.0041)	(0.0047)	(0.0046)	(0.0049)
Td	-0.016***	-0.023***	-0.065***	-0.097***	-0.345***	-0.374***	-0.848***	-0.814***	0.051***	0.036***	-0.057***	-0.063***
	(0.0013)	(0.0019)	(0.0014)	(0.0020)	(0.0036)	(0.0034)	(0.0038)	(0.0036)	(0.0007)	(0.0011)	(0.0007)	(0.0011)
C	1.611***	1.541***	-2.879***	-3.389***	2.981***	4.251***	0.129***	-0.124***	2.735***	1.266***	-3.113***	-3.469***
	(0.0204)	(0.0272)	(0.0213)	(0.0293)	(0.0641)	(0.0651)	(0.06290)	(0.0601)	(0.0605)	(0.0854)	(0.0665)	(0.0916)

(Continued)

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Table 4. *Equation estimation (8): hit = 1-exp(-exp(xitıβD + γt + ui)) for IMSS, ISSTE and BPS* - Continued

	IMSS				ISSTE				BPS			
	Contributing		Not contributing		Contributing		Not contributing		Contributing		Not contributing	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Obs,	9916056	5407595	10080142	7285337	1492478	1764256	1576393	1762794	6330295	5295346	5292822	4541562
% of accurate predictions	67.57%	67.02%	59.73%	61.11%	68.08%	68.51%	60.98%	62.93%	74.32%	66.43%	54.54%	54.64%

Note: Standard error between parentheses $^{*}p<0.1$ $^{**}p<0.05$ $^{***}p<0.01$.
Source: Authors' elaboration.

Overall, the results are similar to those for the IMSS affiliates. The length of the spell is significant at 1 per cent and the expected negative sign holds true in all cases. In this sense, for ISSSTE workers, as for IMSS workers, the likelihood of changing the contributing status drops as the length of the spell in the current status increases. Unlike as was observed for IMSS workers, this effect is lower for older workers. Regardless, the age and income level of ISSSTE workers has a negative/positive effect on the likelihood of transitioning out of the contributing/not contributing status, though the age effect is smaller among this group of workers.

Finally, the results of the estimations for workers enrolled in the BPS also suggest a moderate regression adjustment. However, compared with the Mexican institutions, there are observed larger differences in the accuracy of the model by sex and kind of transition (Table 4). Indeed, the estimations indicate that, on average, the model predicts correctly 74 per cent and 67 per cent of the men and women transitioning out of the contributing status respectively. The accuracy of the model is lower for transitioning out of the not contributing status, with an average of 54.5 per cent correct predictions for men and women.

In most cases, the explanatory variables included in the estimated models are statistically significant at 1 per cent and they present the expected signs. Similar to the Mexican institutions, in every case, the estimated coefficient for the spell length is significant at 1 per cent and presents the expected negative sign. This implies that the longer a worker remains in a given status, the less likely a change in that status will occur.

Statistically speaking, the positive effect of the length of the spell variable is less intense in the estimations for older groups of workers. In this sense, the natural logarithm for the length of the spell on persons aged 30–50 and on persons older than age 50 is significant and positive for both men and women in the estimations tied to the risk rate for the contributing and not contributing status. The only exception is the coefficient associated with men aged 30–50 for the risk rate of the not contributing status, which has a negative sign that reinforces the general effect. In this case, the length of the spell effect is particularly intense for middle-age men's active life, diminishing the likelihood of transition to the contributing status.

The older that workers become, the more likely they are to hold a formal job. Indeed, age has a negative and significant effect on the likelihood of transitioning out of the contributing status for men and women alike. In contrast, age has a positive and significant effect on the likelihood of transitioning from not contributing to contributing status in the case of men. In the case of women, however, the likelihood of transitioning from the contributing to not contributing status decreases with age.

Lastly, as for IMSS and ISSTE, both men and women workers with high income levels are more likely to hold a formal job than those with lower incomes. Based on

the information yielded by our estimations, a higher income implies less likelihood of transitioning from the contributing to not contributing status, and greater likelihood of transitioning from the not contributing to contributing status.

Based on the preceding estimation, the transition rates for the sample predictions were calculated for the three social security institutions. In the three institutions, the predicted rates of transitions for age and sex proved highly accurate with respect to the observed transition rates.[10]

In the case of IMSS workers, transition rates are relatively high, with an average likelihood of transitioning out of the contributing status of 6 per cent. This likelihood is particularly high for the youngest age groups. The likelihood that workers younger than age 20 transition out of the contributing status is over 10 per cent. Those rates tend to decrease up to ages 55–60. At the same time, the average rate of transition from the not contributing to contributing status is approximately 5.5 per cent, though it falls with older age groups.

For ISSTE affiliates, transition rates are again relatively high, with an average likelihood of transitioning out of the contributing status of 9 per cent. That likelihood is particularly high for the youngest age groups. The likelihood that workers younger than age 20 transition out of the contributing status is 12 per cent. Those rates tend to decrease up to ages 55–60. At the same time, the average rate of transition from the not contributing to contributing status is approximately 9 per cent, though it falls with older age groups.

Finally, for BPS affiliates, the results indicate an average likelihood of transitioning out of the contributing status of around 5 per cent for men and somewhat lower for women. That likelihood is particularly high for the youngest age groups. The likelihood that male workers younger than age 20 transition out of the contributing status is over 10 per cent; the figure for women workers in that age group is close to 10 per cent. Those rates tend to decrease until between ages 55–60 when they once again start to increase, though they never reach the same levels in the case of male workers.

The pattern for the average rate of transition from the not contributing to contributing status is similar, with an average rate somewhat below 5 per cent. Once again, the likelihood of making a transition is higher at the beginning of a worker's working life. This likelihood decreases toward middle age and then rises slightly again for older workers. Here, transition rates are somewhat higher for men than for women.

Having obtained the estimation results for the transition rates, the second stage of the methodological approach was applied. The results obtained using the length of the spell model simulate the employment histories of a hypothetical generation

10. This article is supplemented by an online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix A, Figures A2, A3 and A4.

according to the methodology presented. To that end, the unemployment rate and income are assumed to be at the sample's average levels.

Table 5 shows the proportion of workers for each institution who, according to the simulations, would have accumulated 15, 20, 25 and 30 contribution years at age 65 and age 70, according to sex. Figure 2 shows the distribution at age 65.

It is estimated that 42.5 per cent of all workers, male and female, enrolled in the IMSS at some point, and 57 per cent of those enrolled in the ISSSTE would reach the requirement of 25 years of contributions at age 65; that percentage rises to 45 per cent and 64 per cent, respectively for the IMSS and the ISSSTE, if retirement age is delayed to age 70. If the required years of contribution were reduced to 20 years, as established in 2020, those rates would rise to 55 per cent for IMSS workers and 76 per cent for ISSTE workers. These results imply that the elasticity of coverage in relation to the retirement age is 1.0 for the IMSS and 1.6 for the ISSSTE, while the elasticity of the coverage in relation to the number of years of contributions is -1.57 and - 1.67, respectively.

These results allow us to project that, under current parameters, Mexico would realize a relatively low contributory coverage rate in the future, just above 55 per cent, given the greater relative participation of the IMSS in the system. This proportion of coverage, however, is significantly higher than the current records observed from household surveys, where contributory coverage does not reach 30 per cent, and is also larger than the proportion of formally salaried workers, which sits at less than 40 per cent.

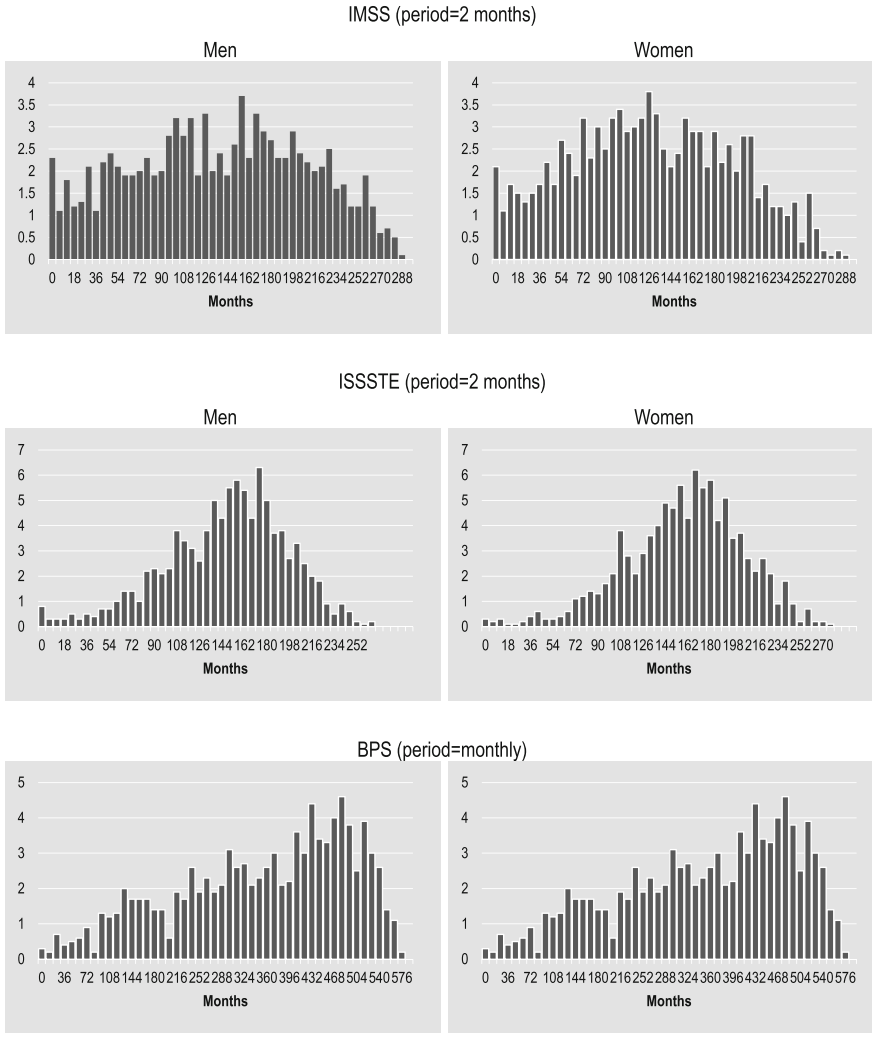
In the case of Uruguay's BPS, simulations indicate that 51.8 per cent of male workers and 46.2 per cent of female workers would reach 30 contribution years at age 60, thus meeting the BPS current standard eligibility requirements. However, in the last reform in 2008, Uruguay incorporated combinations of age

Table 5. *Proportion of workers who would have accumulated 20, 25 and 30 contribution years at age 65 and age 70, by institution and sex*

	Age (years)	Men				Women			
		I_{15}	I_{20}	I_{25}	I_{30}	I_{15}	I_{20}	I_{25}	I_{30}
IMSS	65	0.63	0.58	0.46	0.31	0.59	0.53	0.39	0.25
	70	0.65	0.61	0.48	0.35	0.62	0.58	0.43	0.3
ISSTE	65	0.79	0.73	0.53	0.25	0.84	0.79	0.61	0.34
	70	0.82	0.77	0.6	0.35	0.89	0.84	0.68	0.43
BPS	65	0.83	0.769	0.682	0.557	0.83	0.771	0.662	0.535
	70	0.84	0.779	0.694	0.582	0.85	0.807	0.711	0.591

Source: Authors' elaboration based on BDNSAR and BPS data.

Figure 2. *Distribution of workers according to the number of contribution periods accumulated at age 65, by institution and sex.*



Source: Author's elaboration based on BDNSAR and BPS data.

and years of contribution to make access to a contributory pension more flexible, through the so-called criteria of "advanced age". Under this framework, it is possible to access a pension with 25 years of contributions at age 65 or with 15 years of contributions at age 70.

Estimations indicate that at age 65, 68.2 per cent of men and 66.2 per cent of women would have accumulated at least 25 contribution years. These proportions increase to 84 per cent for men and 85 per cent for women when the combination of age 70 with 15 years of contribution is considered. As in Mexico, these projected rates of contributory coverage are higher than the levels of formal employment observed in the household survey.

In this way, with the flexibility introduced by the 2008 reform, it is expected that Uruguay can maintain high levels of coverage in the future that are similar to current levels. This would be the case even with the strict application of employment history records, which will begin to be fully applied in the coming years, which will act to limit the prior discretion regarding the recognition of contribution years. It should be noted that the use of bonuses[11] (the use of which is extended in the Uruguayan system), would allow a larger group of people to meet the eligibility requirement, even if they have not satisfied the contribution requirements for the different ages considered.

It is noteworthy that the expected coverage results in Mexico would increase substantially in the event of adopting a more flexible system, in a manner similar to that of Uruguay. Indeed, estimates indicate that, by age 70, 65 per cent of men and 62 per cent of women covered by the IMSS (the institution with the lowest contribution density but, nonetheless, the most important in Mexico) would have accumulated at least 15 years of contributions. These numbers increase to 82 per cent for men and 89 per cent for women in the case of the ISSTE. Yet, even in this case the coverage level would be lower than in Uruguay (also when considering the relative importance of the IMSS) although the difference would be much smaller than that currently observed in the household surveys.

In summary, the observed past results suggest that part of the coverage differences between Mexico and Uruguay can be explained only in part by the fact that workers in the latter have greater stability within the formal system (greater density of contributions). A further reason for explaining the differences observed, and those projected for the future, is a more flexible regime in the case of Uruguay, which has a long-standing objective of maintaining high pension system coverage.

11. The legislation recognizes that some activities engender greater physical or mental exhaustion and, consequently, the workers who carry these out should be compensated. Thus, the worker can retire with fewer real years of work. An example is the case of teachers, who have a "4 for 3" bonus – the BPS counts 4 years for every 3 worked years.

However, it is highlighted that prioritizing coverage through a more flexible regime creates a challenge, especially as seen in the Uruguayan case, where there is a comparatively high minimum contributory pension. In comparative terms for the Latin America and the Caribbean region, Uruguay ranks high in this regard (see Álvarez et al., 2020). In this context, a relatively low density of contributions inevitably leads to an increase in pension spending and potential financial sustainability problems.[12] This has effectively occurred in Uruguay, where a new reform of the pension system has been under discussion since 2020 with the aim of moderating the growing trajectory of pension spending.

Conclusions

Pension system coverage has traditionally been measured based on household survey data. Coverage of the active population – i.e., the percentage of the economically active or employed population that contributes to social security – is a good indicator to estimate the future scope of pension systems. Estimations of that indicator for Mexico and Uruguay show that such coverage among workers is very low in the case of Mexico (37.5 per cent), while it is comparatively high in the case of Uruguay (approximately 75 per cent).

These indicators are limited, however. They fail to consider the labour dynamic of individuals and the extent to which workers meet the required years of contributions to access the benefit. For that reason, and basing our judgement on household-survey data, countries such as Mexico and Uruguay that differ in terms of economically active population coverage may perform more similarly in terms of the coverage of the passive population. In other words, the pension system coverage is low not only because many people never contribute but also because many workers contribute during only part of their work history, with frequent transitions between contributing and not contributing status. Besides, both countries also present different requirements to access a contributory pension.

The average contribution density for workers in Uruguay is 57 per cent, whereas in Mexico it is 41 per cent for workers in the private sector and 50 per cent for workers in the public sector. Those average values conceal a great deal of heterogeneity, however. While the distribution of contribution density in Mexico and Uruguay clusters at 0 per cent and 100 per cent, most workers are distributed

12. For example, in all cases, there is a retirement calculation procedure that depends, among other things, on the years of contributions. If this calculation indicates an amount greater than the minimum pension, the amount obtained in the calculation is paid. However, if the calculation is below the minimum, the person will obtain the minimum pension.

uniformly between those two extremes. These results suggest frequent transitions between contributing and not contributing status in both countries.

Our results show that average transition rates between the statuses are high in both countries, around 6 per cent for those enrolled in the IMSS and 9 per cent for those enrolled in the ISSSTE in Mexico, and 5 per cent for those enrolled in the BPS in Uruguay. In all cases, the risk of changing status is negatively associated with the length of a worker's spell in her or his status; the longer the spell in a certain status, the lower the likelihood of transitioning out of that status. Thus, young workers are more likely to transition out of the contributing status than their older counterparts, though that relationship decreases as workers age. The age profile suggests that young workers are particularly mobile. At the same time, the risk of transitioning out of a contributing/not contributing status is lower/higher among workers in the highest income quintiles.

Based on the simulation exercise for new work histories, it is estimated that 55 per cent of workers who enrolled at some point in the IMSS would meet the requirement of 20 contribution years at age 65; that percentage is 73 per cent for those enrolled in the ISSSTE. These percentages would increase to 65 per cent for men and 62 per cent for women in the IMSS, and to 82 per cent for men and 89 per cent for women in the ISSTE, if a more flexible option permitting access to a contributory pension at age 70 with 15 years of contributions were included, as in Uruguay.

The results for Uruguay also show that a large proportion of workers have difficulties achieving the requirements for a contributory pension under the standard conditions. Only 42 per cent of those enrolled in the BPS would meet the 30 years of contributions required to be eligible for a contributory benefit at age 60. However, the more flexible access conditions introduced in the 2008 reform would allow this country to maintain a level of coverage above 80 per cent, even with the strict application of the labour history records created in 1996.

The results show the previous strict design of the eligibility conditions for the pension programmes in both systems, compared with the period following the changes introduced to make these more flexible. However, under current labour market conditions, attaining the necessary years of contributions to access a benefit is difficult for a large population segment. In dual labour markets with high levels of informality, there is a heightened risk of interrupted contribution periods or of not meeting the minimum contribution requirements.

For that reason, Mexico reduced the number of years of contributions from 25 to 20 years in 2020. Uruguay had previously reduced the contribution years from 35 to 30 years in 2008, while further extending eligibility for social pension coverage to those of "advanced age", using a progressive scale that allows older persons to retire with fewer years of contributions.

Initiatives, such as the implementation of non-contributory pensions, are very useful to close the coverage gap. Nonetheless, the coverage problem is still largely seen as a discrete rather than a continuous phenomenon. Strategies that provide benefits proportional to contribution density and labour income should be designed to improve coverage equity within the systems and to incentivize a higher level of participation among the elderly.

However, initiatives that prioritize the goal of system coverage are likely to come at a cost as regards the adequacy of the pensions or, possibly, in terms of the system's financial sustainability. A relatively low density of contributions inevitably leads to a problem for pension systems, which could be reflected in one of the three main dimensions of analysis regarding pensions: coverage, adequacy, or financial sustainability. The possible different solutions to be chosen by countries leads to different impacts on these three dimensions, as observed in the analysis of Mexico and Uruguay.

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Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of this article.

The Work Profiler: Revision and maintenance of a profiling tool for the recently unemployed in the Netherlands

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Abstract For the public employment services of many Member countries of the Organisation for Economic Co-operation and Development, the importance of using profiling tools for job seekers is increasing rapidly in importance. With this trend, there is also widening concern about the risks of an over reliance on such tools. Part of the concern lies with a lack of transparency concerning how such tools work. This article aims to address this by offering a detailed investigation of the Work Profiler – the instrument used in the Netherlands by the Institute for Employee Benefits (*Uitvoeringsinstituut Werknemersverzekeringen* – UWV) to predict re-employment success and provide a diagnosis of key factors hindering job seekers' return to work. Professionals use these insights to deepen their understanding of the situation of job seekers and decide together with job seekers how to support their return to work. UWV decided to maintain and revise the Work Profiler through a large-scale study involving a sample of 53,238 people. Work Profiler 1.0 was developed in 2007–2010 and has been in use on a regional basis since 2011

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and nationwide since 2015. This article explains how the new tool (version 2.0; implemented in 2018) works and, most importantly, demonstrates the choices made to ensure that it functions well and is used effectively by professionals. These latter two aspects are rarely discussed in the literature.

Keywords statistical method, job seeker, unemployment benefit, unemployed, the Netherlands

Introduction

For the public employment services (PES) of many Member countries of the Organisation for Economic Co-operation and Development (OECD), the importance of using profiling tools for the unemployed is increasing rapidly (Desiere, Langenbucher and Struyven, 2019). The use of a profiling tool offers job seekers several major advantages as it allows the PES to efficiently and fairly allocate resources to job seekers who need support and to support these job seekers with targeted services (O'Connell, McGuiness and Kelly, 2012). This makes job seekers less reliant upon the individual insights, preferences or capabilities of professionals (Bolhaar, Ketel and van der Klaauw, 2018; Desiere, Langenbucher and Struyven, 2019). Yet, profiling tools are not often implemented in practice for various reasons (Hasluck, 2008; Loxha and Morgandi, 2014). Such reasons may include the inaccuracy of results, lack of acceptance by caseworkers, or being perceived as impractical due to caseworkers not understanding the results (Desiere, Langenbucher and Struyven, 2019). The Dutch PES (*Uitvoeringsinstituut Werknemersverzekeringen* – UWV) uses a profiling instrument, the Work Profiler. The Work Profiler was developed in 2007–2010 and has been used on a regional basis since 2011 and nationwide since 2015 for all unemployed job seekers (Guiaux, Wijnhoven and Havinga, 2018; Wijnhoven and Havinga, 2014).[1] In this article, we describe how the UWV subsequently has maintained and revised the underlying predictive model with special attention being given to its generalized application using a more recent and extensive sample of unemployed people in the Netherlands.

Owing to the dynamic nature of labour markets, and of society more generally, prediction models should be revised regularly to maintain predictive accuracy and

1. In 2011, the first 11 UWV offices started working with the Work Profiler 1.0, but it was not until 2015 that it became the standard tool for all 35 offices and for all recently unemployed job seekers.

improve their quality (Black et al., 2003; Brouwer, Bakker and Schellekens, 2015; Caswell, Marston and Larsen, 2010; Frölich, 2006; O'Connell et al., 2009). For this current study, no publications could be identified that documented the maintenance or revision of predictive models in the field of unemployment. This article therefore seeks to make an important contribution to the body of literature on profiling tools. Specifically, it offers a transparent report of the revision and maintenance of a profiling tool, the Work Profiler used by the UWV in the Netherlands, and highlights several aspects related to the use of this tool to provide targeted services for job seekers as well as to its theoretical framework.

Work Profiler 1.0

The original version of the Work Profiler was based on a model with ten key factors which, at the start of unemployment period, predicted re-employment success within a year (Brouwer, Bakker and Schellekens, 2015). The aim was to create a parsimonious tool that could accurately predict reemployment success and identify factors amenable to change that could help shorten the duration of unemployment. In other words, with as few questions as possible, this sought a) to obtain a clear indication of which job seekers were in need of support, and b) to suitably tailor services to their personal needs. Consequently, the Work Profiler offers two outcomes for each individual job seeker. First, it indicates the probability of reemployment within one year, expressed as a percentage between zero and 100 per cent. Second, it shows which factors predict reemployment success and whether they hinder or promote the return to work. The latter information is obtained by comparing the factor scores of job seekers who returned to work within one year with those of the job seekers who did not return to work within one year. These two outcomes make it possible to decide which job seekers need help most urgently as well as offer a framework for the tailoring of services, because they show which factors to focus upon to enhance reemployment probabilities.

Elaboration on the research steps and consequent considerations taken during the implementation of Work Profiler 1.0 is well documented (see Brouwer et al. 2011; Brouwer, Bakker and Schellekens, 2015; Wijnhoven and Havinga, 2014). An extensive literature review has identified a list of 550 items that could be predictive for reemployment success. These items corresponded with the variable groups in the Wanberg model (Kanfer, Wanberg and Kantrowitz, 2001; Wanberg, Song and Hough, 2002) and constructs of the Theory of Planned Behavior (TPB) (Ajzen, 1985; 1991) and the Valence-Instrumentality-Expectancy Model (VIE) (Vroom, 1964). In a series of cross-sectional and longitudinal research steps undertaken during 2007–2010, the list was reduced from 550 items (step 1) to 155 items (step 2) to 19 items (step 3) (Brouwer

et al., 2011). These 19 items were further reduced into ten subscales by summing item scores that measured the same underlying construct (such as views on the return to work). The result produced a ten key factor model that proved predictive for reemployment success within one year. In the implementation step of the Work Profiler, UWV added an additional item, "physical work ability", for the practical reason that professionals considered this item relevant for services (Wijnhoven and Havinga, 2014). Nineteen items were obtained through a digital questionnaire completed by all those who had recently become unemployed in the Netherlands. One item, "Age", is taken from administrative data. Thus, Work Profiler 1.0 contains 11 key factors. Its accuracy to predict at the start of unemployment whether a job seeker will return to work within one year was 69 per cent (Brouwer, Bakker and Schellekens, 2015).

Job seekers may only benefit from a profiling tool if professionals understand and are able to explain its mechanisms to the job seeker. The theoretical context allows professional caseworkers to understand the mechanisms behind specific factors: how to influence the situation and why certain services may enhance the chance of reemployment. Taken together, the three theoretical models cited previously (Wanberg, TPB and VIE) incorporate non-amenable and amenable factors. Non-amenable factors, such as age, gender and education, are generally understood to influence reemployment. Amenable factors address a job seeker's psychosocial situation, such as job search intention, job search behaviour, motivation and perceived health. Knowledge about these is necessary to tailor services, given that not all job seekers will likely benefit to the same extent from the same type of assistance. The theoretical fundament of the Work Profiler adds to a better understanding of the job search and reemployment process and contributes to the acceptance, trust and use of the tool by professionals. The validity of the three theoretical models was reaffirmed by the research underpinning Work Profiler 1.0.

Maintenance of predictive validity

Profiling models should be revised regularly to reflect the fact that labour market demands change as a result of economic and societal developments; in other words, labour markets and society are dynamic (e.g., Black et al., 2003; Caswell, Marston and Larsen, 2010; Frölich, 2006; O'Connell et al., 2009). Changing labour market demands affect job seekers who seek support from the PES; for example, in a recession more job seekers will call upon the PES, while opportunities on the labour market will be more limited. Changing labour market demands and other societal developments may also affect the services provided by the PES (e.g., across the last decade, the UWV has increasingly shifted to offering online services for job seekers). Due to these changes, profiling models require maintenance. It is to

be underlined that revising the profiling model not only helps to maintain its predictive power, but also offers the possibility to take into account the evolving nature of the services provided by the PES and their fit with job seekers' needs.

Maintenance of predictive accuracy is also a factor that affects the acceptance and trust of profiling tools, since actual and perceived accuracy may differ. In Switzerland, for example, the development of a profiling model was cancelled because caseworkers did not accept and trust the profiling tool, which they perceived to lack in predictive accuracy (Arni and Schiprowsky, 2015). Only a few studies have compared the accuracy of profiling models with the accuracy of professionals' judgements. Case studies of the Swiss and Swedish PES (Arni and Schiprowski, 2015; Arbetsförmedlingen, 2014) show that their profiling models achieved a higher degree of accuracy than professional assessments. Regardless, professionals may still perceive their own assessment of a job seeker's situation to be more accurate. In the Swiss case, caseworkers perceived the prognosis as too low or not fitting special cases in 44 per cent of the cases. An explanation for this is that, in most of such cases, caseworkers had access to additional information that was not included in the profiling model (Arni and Schiprowsky, 2015). The Swiss study concluded that higher predictive accuracy may indeed increase trust and acceptance among caseworkers, but it remains important to also communicate how results of a profiling tool provide caseworkers with additional information to supplement their own assessment of the jobseeker's situation. In this vein, the PES in New Zealand consciously uses analytics to support caseworker decision making (Desiere, Langenbucher and Struyven, 2019). For job seekers, the question is not "who" or "what" performs more accurately, instead it is how caseworkers can complement the professional assessment with results provided by the tool, with the aim of providing job seekers with truly tailored services.

Model quality and accuracy depend partly upon the type of data and research methods used to develop the profiling model. Richer and more recent data will likely improve the accuracy of the model. However, the increasing body of profiling tools within OECD Member countries also demonstrates that adding behavioural factors to the prediction model will not necessarily significantly improve its overall accuracy (Desiere, Langenbucher and Struyven, 2019). The added value of these factors lies more in the insights they offer to the PES.

When using profiling models, it is not only the accuracy of the model that matters. Also important is the extent to which the decision rule[2] correctly classifies job seekers into different groups (van Landeghem, Desiere and

2. Policy makers or researchers use a decision rule, or cut-off point, to define who belongs to the risk groups under scrutiny. For example, for the Work Profiler, the decision rule is the cut-off point of 0.5 probability of returning to work within one year. Job seekers with a lower probability are defined as belonging to the at-risk group of becoming long-term unemployed.

Struyven, 2021). Typically, two types of errors may occur. First, a misclassification of job seekers as short-term unemployed, but who eventually will become long-term unemployed. Second, a misclassification of job seekers as long-term unemployed, but who eventually will not be. Related to these errors, consideration must be given to the sensitivity and specificity of the model. These two terms pertain to the percentage of those who are correctly classified as a low-risk group (in this case, job seekers) who will return to work in a relatively short term (sensitivity), and those correctly classified as a high-risk group of not returning to work and thus becoming long term unemployed (specificity).[3] There is a trade-off between levels of sensitivity and specificity. Specifically, increasing sensitivity decreases specificity, and vice versa. Policy makers should take this into account when deciding upon a specific decision rule.

All the above observations apply to the Work Profiler tool. The model underpinning version 1.0 predicted accurately for 69 per cent of cases whether a person entering unemployment would obtain paid work within one year or not, but it was suspected that the model's accuracy had dropped in 2014–2015. One option to improve the model's accuracy was simply to adjust the values of the factors based upon a more recent population sample to re-calibrate the Work Profiler 1.0.

Nevertheless, there were several important reasons why the UWV opted for a more thorough revision of the design of Work Profiler tool. First, there were doubts about the generalizability of the Work Profiler. The longitudinal research underpinning the first version was conducted only in the Province of North Holland, and not across the entirety of the Netherlands. It was therefore important to ensure that the instrument worked well nationwide (see also the section on Method). The response rate to the questionnaire used to develop Work Profiler 1.0 was low (27 per cent), a rate that the UWV wished to increase substantially to support the development of the new version.

Second, there were concerns about the method used for analysing the data obtained during the research. The dataset used to develop Work Profiler 1.0 was not large enough to immediately apply a multivariate logistical regression analysis. To remedy this, first a univariate analysis was undertaken to reduce the number of factors. Only significant factors were then used for the multivariate analysis (Brouwer, Bakker and Schellekens, 2015). However, this solution increased the risk of excluding important predictors. For the development of Work Profiler 2.0, the UWV wished to substantially increase the dataset, an

3. Specificity (i.e., correctly predicted negatives) is defined as the proportion of respondents who did not return to work within one year and who are correctly classified by the model as not returning to work. Sensitivity (i.e. correctly predicted positives) is defined as the proportion of respondents who resumed work within one year and who are correctly classified as "resuming work within one year".

outcome which would remove the need to apply the unsatisfactory remedy used for the small dataset for Work Profiler 1.0.

Third, there was a question about the outcome variable. During the development of Work Profiler 1.0, the ability to see what might happen with a recently unemployed person over time was limited. This meant that the most suitable outcome variable at the time was whether a person after a year was still in receipt of unemployment benefit (i.e., unemployed), or not (i.e., reemployed). Of course, in addition to return to work, there are other reasons why the receipt of benefit may cease, such as an extended period of ill health, migration or death. Access to additional information made available during the development of the new Work Profiler permitted to change the outcome variable to work resumption, independently of whether the benefit had ceased or not, which is better suited than the prior outcome variable.

In 2014, the UWV commenced the research that led to the development of Work Profiler 2.0 (Dusseldorp, Hofstetter and Sonke, 2018). The next section outlines the research steps in this process.

Method

Participants

The participants were recently unemployed job seekers who had applied for an unemployment benefit at the Dutch PES. Included were all job seekers from 11 PES offices, geographically spread throughout the country, across the period 1 March 2014 to 28 February 2015. Participants were selected if they were entitled to unemployment benefits for more than 3 months, were still receiving benefits 10 weeks after their application, had access to the Internet, and lived in the Netherlands. The sample contained 76,817 job seekers, who received a digital questionnaire containing a list of relevant items.[4] A total of 53,238 job seekers responded (total response rate of 69.3 per cent; 50.9 per cent women, 49.1 per cent men; mean age of 42.1 years; level of education: 20 per cent primary school/lower vocational training, 51.4 per cent middle education, 28.6 per cent higher education). At the time of data collection, the number of Dutch PES offices was reduced from 50 to 35, but the 11 participating locations all continued to operate during the entire period of data collection. Of the collected data, 0.3 per cent of the sample was not used in the analysis because of missing values in some of the measurements, mainly from the administrative data. Finally, complete data were available for 53,079 job seekers. A comparison of respondents

4. This article is supplemented by an extensive online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix A, Table A.1.

and non-respondents revealed only marginal differences between both groups regarding their gender, education, nationality and pre-benefit employment. The effect sizes of these differences were small (Cramer's $V < .2$). The largest difference between respondents and non-respondents was a moderate difference in age ($M = 42.1$ vs. $M = 38.4$; $p < 0.001$; Cohen's $d = .32$). It was concluded that the respondents formed a representative sample for Dutch job seekers receiving unemployment benefits. Moreover, the study's participants represented 25 per cent of the total population of recently unemployed people registered with the Dutch PES during that period. To ensure that the sample was representative of the entire population with unemployment benefits, the 25 per cent participating sample was compared with the remaining 75 per cent of job seekers at the other PES offices regarding several key characteristics, such as reemployment, age, gender and education. The analysis confirmed that the participating job seekers were representative of the entire population (Dusseldorp, Hofstetter and Sonke, 2018).

Questionnaire and procedure

To operationalize the factors from the three theoretical models into concrete questions (i.e., items) we used various validated questionnaires (e.g., Blau, 1994; Schellekens, Langkamp and De Vries, 2005; Vinokur and Caplan, 1987; Wanberg, Song and Hough, 2002). This resulted in a list of 550 items, most of which were phrased in English with fewer in Dutch. All items were subsequently translated into Dutch. An elaborate description of the items and the response scales is found in Schellekens et al. (2007); Brouwer et al. (2011); and Brouwer, Bakker and Schellekens (2015).

In this prospective cohort study, a questionnaire was administered to a one-year cohort of unemployment benefit recipients.[5] Participants received the online questionnaire between the sixth and tenth week after making their application to receive unemployment benefits. The questionnaire was made available to participants on the PES online platform, by means of which the PES delivers all online services (e.g., online coaching, webinars, online workshops) and communicates with clients. Participants received a digital message requesting them to complete the online questionnaire and for which they were given two weeks to respond. After one week, the participants received a reminder message.

5. The job seekers in this study concerned the recently unemployed who have just lost their work as an employee and who are entitled to unemployment benefit provided by the Dutch PES. Job seekers that have become unemployed through other circumstances (e.g., never having had a job, wanting to change work, or have been jobless for a long period) represent a different category, the responsibility for whom lies with Dutch municipalities that may provide social assistance and offer support in job searches.

Questionnaire items

The questionnaire for the current study was specifically developed to revise and maintain the earlier predictive model of the Work Profiler 1.0 (Brouwer et al., 2011). It comprised all 20 items of Work Profiler 1.0, and also new and re-inserted items from the earlier set of 155 items (see section on Work Profiler 1.0). The questionnaire items reflected elements from the three theoretical models (Wanberg, TPB and VIE), but not every element of the three theoretical models was included in the questionnaire.

The new and re-inserted items were added only after several exploratory analyses. First, cluster analyses were used to obtain sets of related predictors for reemployment (Romesburg, 2004). In addition, the data used for the analyses of the original model were updated with more detailed employment data. Also added was additional reemployment data from a new set of PES administrative data. Using these data, the reemployment status of more participants was available (the original dataset contained complete data for 3,618 participants, the new dataset contained complete data for 4,849 participants). With these data, multivariate logistic regression analyses checked whether the extra items had a statistical relationship with reemployment status in the total sample. If so, these items were selected as potential predictors that should be reconsidered when updating the original model. In addition, two expert group meetings were held with professionals from the PES to review the selection of potential predictors. Based on their feedback the sequence of items in the final revised questionnaire was determined and some items were reformulated in simpler Dutch. Items from validated questionnaires were not reformulated. The final questionnaire contained 45 items and a further ten items were acquired through administrative data.[6]

Measurements

Measurement of the outcome variable

The outcome variable "Reemployment status after one year" was determined in the following manner. Respondents were defined as reemployed (=1) when their benefit had completely ceased and they had returned to work, according to administrative data, within one year after the start of receiving the benefit; otherwise, they were defined as not reemployed (=0). To assess whether claims to benefits were valid, the PES has a reliable administrative record of benefit use

6. This article is supplemented by an extensive online Appendix developed by the authors and made available to readers (see Supporting Information). See full list of items in Appendix A, Table A.1.

and employment status for all Dutch citizens. The study followed up on the reemployment status of all participants until 30 April 2016. Depending upon the duration of their previous employment, job seekers may be eligible for a maximum benefit entitlement period of up to three years.

It should be noted that, in the Dutch benefit system, it is possible to become partly reemployed while still receiving unemployment benefits. In that case, income from the part-time job will be partly deducted from the benefit amount. For this study, this situation was not counted as reemployment.

Measurement of predictors

For the analyses, 37 factors (i.e., predictors) were constructed based on the 45 questionnaire items and ten administration items. Some of these items were considered as separate factors (e.g., "Age"). Other items could be combined straightforwardly to construct one factor, for example, the factor "Number of hours per week available for work" was calculated with the answers to the following two questions: "How many days per week are you available for work" multiplied by the answer for "How many hours per day are you available for work". For the remaining 27 items that were assumed to measure ten factors, confirmatory factor analysis was performed. This analysis showed a good fit ($CFI \geq .95$, $NFI \geq .95$, $TLI \geq .95$, and $RMSEA < .05$), implying that the assumed structure was appropriate. Based on this analysis, sum scores were computed for the items that loaded on the same factor. These sum scores were used as predictors in the next step of the analysis.

All predictors are presented in the online Appendix,[7] including corresponding items, answer possibilities and corresponding literature. For the administrative data the relevant categories are also included. As mentioned previously, the predictors mainly reflect the three theoretical models. For ease of understanding, the items have all been translated in this article from Dutch to English, except for those that come from already validated English questionnaires.

Analysis and results

The aim of the analysis was to obtain a parsimonious, understandable model with as high as possible predictive accuracy. For the development of this predictive model, the research sample was randomly divided into three subsamples (Table 1). A training sample (n = 26,541; 50 per cent), a validation sample (n = 13,269; 25 per cent) and a test sample (n = 13,269; 25 per cent). The

7. This article is supplemented by an extensive online Appendix developed by the authors and made available to readers (see Supporting Information). See full list of items in Appendix A, Table A.1.

Table 1. *Reemployment within one year in the total sample and subsamples*

	Reemployment within one year*n* (%)	Total *n* (%)
Total sample of job seekers	27,670 (52%)	53,079 (100%)
Training sample	13,857 (52%)	26,541 (100%)
Validation sample	6,945 (52%)	13,269 (100%)
Test sample	6,868 (52%)	13,269 (100%)

Source: Authors' elaboration.

training sample was used to estimate the univariate and multivariate logistic regression models (the latter using all available predictors). The validation set was used for model selection, and the test set was used to estimate the out-of-sample predictive accuracy; that is, the accuracy of the prediction for future respondents (Hastie, Tibshirani and Friedman, 2001). Model selection was based on statistical criteria (see below) as well as theoretical criteria. The theoretical criterion to drop a predictor from the model was that its relationship with reemployment status was not in line with the expectations of any of the aforementioned three theories.

Several criteria were applied to assess the goodness-of-fit of the models: The Nagelkerke R^2, the AUC (area-under-the curve), and the Brier score. The Nagelkerke R^2 for logistic regression is comparable to the multiple R^2 for multiple regression, and a value of equal to or more than .3 is generally accepted as a good fit in the social sciences (Cohen, 1992a). We consider an AUC between .7 and .8 as moderately predictive, and values above .8 as very good (Weinstein and Fineberg, 1980). A Brier score lower than .2 is regarded as good (van Houwelingen and Putter, 2011). Effect sizes of predictors were computed as follows: the difference in the variance-accounted-for of the regression model with the predictor compared to the variance-accounted for of the regression model without the predictor (f^2; Cohen, 1992b). The analysis strategy followed the following five steps:

Step 1

During the first step of model building, a training sample was used to analyse the data and estimate which variables predicted reemployment. First, a univariate logistic regression was used to verify whether the relationship with reemployment lay in the theoretically expected direction.[8] Also verified was whether the

8. This article is supplemented by an extensive online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix A, Table A.2.

relationship was linear, and when it was not, a categorical variant of the variable was used in further analyses. For this purpose, it was necessary to identify which univariate model, either the one with a continuous predictor or that with a categorical version of the same predictor, fitted the data best based on Nagelkerke R^2. The assumption of a linear relationship between the log odds of reemployment and specific predictors was visually checked. This was done by looking at the marginal model plots. The univariate analyses showed that all 37 predictors were related with reemployment as theoretically expected, and that the categorical variant of "Years employed in the last job" fitted the data best.

Step 2

This step involved using a multivariate logistic regression model with all 37 predictors. A check was made for linearity and multicollinearity and whether the Variance Inflation Factor (VIF) did not exceed 5 (Rogerson, 2001). The multivariate analyses showed multicollinearity ($r > .8$) for two pairs of variables. One pair was "Average number of hours worked per week prior to unemployment", and "Number of hours per week unemployed" ($r = .91$); the other pair was "Maximum duration of unemployment benefits", and "Age" ($r = .87$). From the first pair, the "Number of hours per week unemployed" was dropped from the analysis. A marginal model plot showed a non-linear relationship between "Average number of hours worked per week" and "Reemployment status", therefore the "Average number of hours worked per week" was categorized in terms of 24 hours or less, between 25 hours and 32 hours, and more than 33 hours. From the other pair, the study dichotomized the "Maximum duration of unemployment benefits" (0 = less than 12 months and 1 = more than 12 months) and kept "Age" as a continuous variable. After these alterations, all VIFs were below 5.

Next, it was assessed whether all the relationships in the multivariate model were still in line with theoretical expectations. For seven variables, the relationship with reemployment was not as expected theoretically. In addition, the effect sizes for these seven variables were very low ($f^2 < .003$). Given that the aim was to obtain a predictive model that fits with theoretical expectations (i.e., to obtain a profiling tool that can be explained to the professional practitioners who work with it), the following variables were dropped from further analyses: "Job search attitude regarding advantageousness/pleasantness", "Subjective norm family and partner", "Job search attitude regarding usefulness and necessity", "External variable attribution", "Readiness to accept work with undesirable characteristics", "Self-efficacy (preparation)", and "Average number of hours worked per week prior to unemployment").

Step 3

This step saw the selection of the best fitting and most parsimonious model using the validation sample. The number of predictors was reduced by performing three stepwise selection methods (i.e., backward and forward selection, and a combination of both). As is recommended, model selection was based on AIC (Akaike Information Criterion) as well as BIC (Bayesian Information Criterion), with smaller values of AIC and BIC indicating better fit (Kuha, 2004). In total, six stepwise logistic regressions (three selection methods times two criteria) were run to choose the model with the best fit, the smallest number of predictors and the highest predictive accuracy in the validation sample. In general, the BIC resulted in more parsimonious models (i.e., the smallest number of predictor variables). All three selection methods with the BIC criterion resulted in the same model. The most parsimonious model contained 18 predictors,[9] named Work Profiler 2.0, fit well ($R^2 > .30$, AUC =.77), had a low Brier score (.19). Of the 11 factors of Work Profiler 1.0, nine are still present in Work Profiler 2.0. Three factors from version 1.0 were combined into one single factor ("Perceived health"), which means that the nine recurring factors were reduced to seven in Work Profiler 2.0. Furthermore, Work Profiler 2.0 includes 11 new factors, such as the "Position within a household", the "Industry prior to unemployment", and "Income besides the unemployment benefit". The five most important factors for predicting reemployment were "Age", "Years employed in last job", "Views on return to work", "Desired profession", and "Position within the household".

Step 4

This step used the test sample to estimate the predictive accuracy of the final model. This involved assessing the quality of the final prediction model, the predictive validity, with the AUC. For use in practice, also assessed were the specificity and sensitivity of the model in the test sample at different cut-off points. As discussed previously, specificity (i.e., correctly predicted negatives) is defined as the proportion of respondents who did not return to work within one year who are correctly classified by the model as "not returning to work". Sensitivity (i.e., correctly predicted positives) is defined as the proportion of respondents who resumed work within one year who are correctly classified as "resuming work within one year". Table 2 shows how there is a trade-off between specificity and sensitivity at different cut-off points: the model with a set value for sensitivity of 95 per cent has a specificity of 34 per cent, and the model with specificity

9. This article is supplemented by an extensive online Appendix developed by the authors and made available to readers (see Supporting Information). See Appendix B, Table B.1.

Table 2. *Predictive characteristics of the most parsimonious, interpretable model for the prediction of reemployment status within 12 months on the test data set (n = 13,269)*

SN	SP	Cut-off value	% correctly predicted	SN + SP	AUC	Brier
25.7	95.0	0.80	59.1	120.7	0.78	0.19
40.1	90.0	0.72	64.2	130.1		
49.2	85.0	0.66	66.5	134.2		
57.3	80.0	0.61	68.3	137.3		
63.7	75.0	0.57	69.1	138.7		
69.1	70.0	0.53	69.5	139.1		
70.0	69.2	0.52	69.6	139.2		
75.0	64.7	0.49	70.0	139.7		
80.0	**59.9**	**0.45**	**70.3**	**139.9**		
85.0	53.7	0.40	69.9	138.7		
90.0	46.1	0.34	68.8	136.1		
95.0	34.3	0.27	65.7	129.3		

Note: SN = Sensitivity; SP = Specificity; AUC = Area-under-the-curve; row with highest predictive accuracy is shown in bold.

Source: Authors' elaboration.

of 95 per cent has a sensitivity of 26 per cent. At a cut-off value of 0.45, the highest correct test-set classification was obtained (70.3 per cent) with a sensitivity of 80 per cent and a specificity of 60 per cent. Thus, at the cut-off value of 0.45, the highest predictive accuracy of Work Profiler 2.0 was 70.3 per cent.

To show the increase in predictive accuracy of this final model compared with Work Profiler 1.0, the predictive accuracy of the Work Profiler 1.0 model was estimated using the test sample. Table 3 shows a similar trade-off between sensitivity and specificity at different cut-off points and that the Work Profiler 1.0 model obtains a lower accuracy than the Work Profiler 2.0 model at all levels. The highest accuracy of the Work Profiler 1.0 model has dropped to 66.8 per cent at the cut-off value of 0.57. This confirms that although the Work Profiler 1.0 is quite robust, accuracy drops in the long term from 69 per cent to 66.8 per cent. As stated above, the Work Profiler 2.0 model has a substantially higher accuracy of 70.3 per cent.

Step 5

In the final step, the norms for diagnostic purposes were determined. These norms are created to show professionals which factors (out of the 18 factors) hinder or

Table 3. *Predictive characteristics of Work Profiler 1.0 on the same test data set (n = 13,269)*

SN	SP	Cut-off value	% correctly predicted	SN + SP	AUC	Brier
22.4	95.0	0.82	57.4	117.4	0.74	0.21
35.5	90.0	0.77	61.8	125.5		
44.3	85.0	0.72	63.9	129.3		
51.5	80.0	0.69	65.3	131.5		
58.1	75.0	0.65	66.2	133.1		
62.8	70.0	0.61	66.3	132.8		
70.0	63.4	0.57	66.8	133.4		
75.0	58.0	0.53	66.8	133.0		
80.0	52.5	0.49	66.7	132.5		
85.0	46.1	0.44	66.2	131.1		
90.0	38.0	0.38	64.9	128.0		
95.0	28.7	0.31	63.0	123.7		

Note: SN = Sensitivity; SP = Specificity; AUC = Area-under-the-curve; row with highest predictive accuracy is shown in bold.

Source: Authors' elaboration.

facilitate a specific job seeker to return to work. A different approach for numeric factors was used compared to categorical factors. For the numeric factors, the norms were created using the scores of the group of job seekers in the sample who returned to work within one year. The first task was to convert these job seekers' raw scores for each factor into *T*-scores (Eggen and Sanders, 1993),[10,11] using the following equation: standardized *z*-score*10 + 50, resulting in scores with a mean of 50 and standard deviation (SD) of 10. Then these scores were split into five categories based on the SD: -1.5 SD, - 0.5 SD, + 0.5 SD and + 1.5 SD; thus, the boundary values of the categories were 35, 45, 55 and 65, respectively. Table 4 offers an example for the factor "Age".

10. The numerical factors are: "Age", "Views on return to work", "Job search behaviour regarding contact with employers", "Perceived health", "Readiness to accept a fulltime job", "General work ability", "Number of hours per week available for work", and "Readiness to accept work with irregular working hours".

11. Alternative approaches (percentiles and stanine) were also tried, but the analyses showed that *T*-scores worked best for caseworkers.

Table 4. *Norms for the factor "Age"*

Age	Hindering	Somewhat hindering	Neither hindering, nor promoting	Somewhat promoting	Promoting
T-score	$\geq$ 65.01	55.01–65.00	45.01–55.00	35.01–45.00	$\leq$ 35.00
Observed score	$\geq$ 55	44–54	33–43	22–32	$\leq$ 21
Norm group (row%)	8.6%	25.7%	28.9%	34.7%	2.1%
Not-reemployed (row%)	22.2%	32.9%	25.6%	13.0%	0.2%

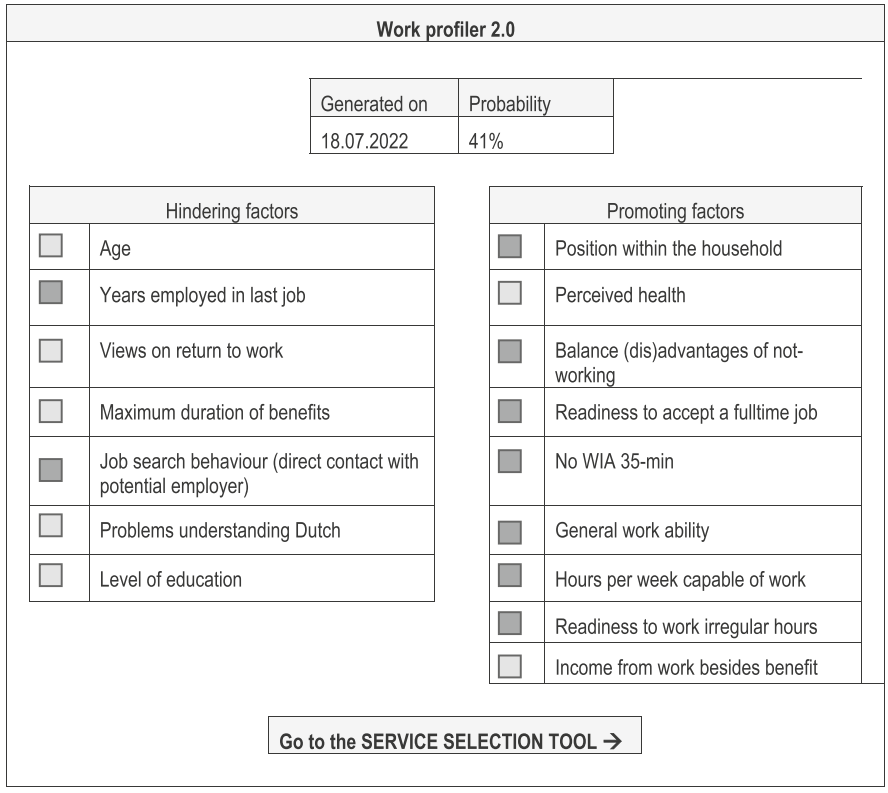
Source: Authors' elaboration.

A three-step approach was developed for the categorical factors.[12] The goal of the approach was to convert each factor (with more than two categories) into five categories in such a way that they were discriminating between those who returned to work within one year and those who did not. The first step was to fit the final logistic regression model multiple times. Each time, the reference category of the factor was changed until all categories served once as the reference category. The second step was to determine which categories could be combined. This was deemed to be the case when two categories did not differ significantly from each other, which in the large sample meant that the odds ratio (OR) was around 1. The third step reran the logistic regression model, with the adjusted categorical factor, and determined the order of the categories: the most hindering category of the scale is always the reference category; if the OR of another category is less than 1.5, this category is placed in the next part of the scale; if the OR is greater than 1.5, the category is placed in the subsequent part of the scale, and so on.

The norms are used to convert the scores of an (new) individual on each factor into a norm score of 1 to 5. In the final Work Profiler 2.0 dashboard, these norm scores are coloured from red (very hindering) to dark green (very promoting). Figure 1 displays them here in black and white meaning that the darker shades in the left column denote factors with a higher level of hinderance; while the darker shades in the right column denote factors with a higher ability to promote. For

12. The categorical factors are: "Years employed in last job", "Position with the household", "Maximum duration of unemployment benefit", "Balance of the advantages and disadvantages of not-working", "WIA 35-min", "Problems understanding Dutch", "Level of education", "Income from work besides the unemployment benefit". Two factors ("Industry prior to unemployment benefit", and "Desired profession") are only used for the prediction for work resumption within one year. The categories within these factors produced results for the caseworkers that were too aggregated to be useful in deciding which services to offer. Instead of this, they use local labour market information, which is available for each region, sector and even for most professions.

Figure 1. *The Work Profiler as a seen by professionals, which includes the probability of work resumption and the scores on each of the factors.*



Source: Authors' elaboration using the Work Profiler 2.0 dashboard.

example, the greatly hindering factors of the job seeker displayed in Figure 1 are "Years in last job" and "Job seeking behaviour". For this latter numeric factor, this job seeker has a norm score of 1, meaning that he or she scored less than -1.5 standard deviation below the mean of the norm group (those who found a job).

Discussion

The steps described above were necessary to revise and maintain the predictive model that is the core of the profiling tool, Work Profiler. The new version, Work Profiler 2.0, consists of 18 factors and obtained the highest test-set accuracy of 70.3 per cent at the cut-off value of 0.45. The first version, Work

Profiler 1.0, had an accuracy of 69.0 per cent on the total sample when it was implemented, and its test-set accuracy dropped to 66.8 per cent at the cut-off value of 0.57. The revised model is based on a more recent and much larger sample of job seekers in the Netherlands, including various sub-categories of unemployed people. The results of this study can be used to help identify which job seekers may benefit – and in which ways – from the services provided by the UWV, as the revised tool accurately predicts reemployment success and shows which factors hinder reemployment.

The need for the maintenance of the profiling tool is important in terms of its predictive validity because of changing labour market demands as well as changes within the services provided by the PES. Caseworkers who assist job seekers to find work are especially familiar with the changes that can occur in the labour market, which can influence the professional services they provide. For instance, occupations for which there is high demand for recruitment may see such demand decline over the course of several years. More generally, periods of economic recession require a different approach than is the case during periods of economic growth. Maintenance of the profiling tool is thus not only essential for keeping the model up to date, but also for safeguarding that the model fits with current developments in the labour market and is aligned fully with job seekers' needs for services.

As well as maintaining the profiling model, policy makers should be aware of the need to think through their decision rule not only when they implement a profiling model in practice, but also when considering policy responses to economic and labour market developments. As illustrated in this article, there is a trade-off between sensitivity and specificity at different cut-off points. Van Landeghem et al. (2021) have discussed this trade-off and its moral implications. This current article would further suggest that the same trade-off and moral implications apply when responding to economic developments. For instance, in a period of economic growth, the total number of job seekers may decline and thus there may be sufficient resources to provide services to a larger portion of job seekers. This can be done by updating the decision rule so that the high-risk group increases. This means increasing the cut-off point, and consequently this will lead to a drop in sensitivity and an increase in specificity. The practical implications of this are that the number of those in the high-risk group would increase, but there will also be more job seekers in this group who may not actually become long-term unemployed and may not really need (or benefit from) the provision of additional services. The opposite outcome is possible when an economic downturn occurs, with the number of job seekers increasing and there may be less capacity to provide a larger portion of job seekers with additional services. In that case, tightening the decision rule lowers the high-risk group and increases sensitivity, meaning that the smaller high-risk group

contains a higher portion of job seekers who do become long-term unemployed and may benefit from additional support.

To ensure that job seekers benefit from tailored services based on a profiling tool, such as the Work Profiler, maintenance of the model involves more than just monitoring predictive accuracy. Improving the model quality is only possible with an extensive revision of the model, such as has been described in this article. An option might be for a labour-intensive variant to revise the entire model, including its theoretical constructs, every five years. The advantage of this approach would be that new information from research or practice-based insights could be inserted and verified to see whether the model had been improved, or not. The alternative approach is for more regular maintenance, which would involve the constant monitoring of the predictive accuracy and periodically re-estimating the weights of the existing model. This approach is especially well suited for short-term adjustments. In our view, a combination of the two approaches would work best. Therefore, since 2020, the year that Work Profiler 2.0 was introduced into practice, the UWV has monitored on a continuous basis the predictive value of the model, re-estimating the model weights annually. A full revision is expected in 2025.

Currently, there are rising voiced concerns, especially in public debates, about the use of algorithms by governments, institutions and corporations (Shin, 2020). This is also observed in profiling tools for job seekers, with some of the criticism expressed leading to the abandonment of using profiling tools, for example in Poland and Switzerland (e.g., Sztandar-Sztanderska and Zieleńska, 2020). The main concerns involve undesirable discrimination and incorrect or inaccurate results that unfairly categorize a job seeker and do not do justice to their individual situation, without there being the possibility for the person concerned or a professional to understand, adjust or, indeed, ignore the outcome of the instrument. It is our opinion that the discussion about the use of profiling tools is shifting towards an unproductive polarization as either "good" or "bad".

The UWV has chosen to use the Work Profiler not as a standalone instrument, but as a complementary tool for the professional. This means that instead of positioning the professional against a profiling tool (as often occurs in debates), and qualifying one as being better than the other, the Work Profiler and professional should complement one another. Professionals are not without bias, but neither are instruments. With the roles of both being used in concert, the risk of bias is reduced and the collective outcome of the two should be much more accurate than the use of just one.

In practice, the professional consults the Work Profiler and uses its outcome together with other available information, for example labour market information, to guide the first conversation with a recently unemployed person. A diagnosis is made by the professional of the job seeker's situation based upon the input of the jobseeker and the Work Profiler, combined with their

professional insights. The UWV professionals are also assisted in their work by a Service Selection Tool that supports decision making concerning types of services to offer to job seekers (see Box 1).

Box 1. The Service Selection Tool

The UWV has created a complementary tool to assist professionals in taking decisions about which type of services to render. This was done in unison with the revised version of the Work Profiler. It is called the Service Selection Tool and makes use of two sources of information (Wijnhoven and Guiaux, 2019). The first source is the accumulated scientific knowledge of what works for whom and at what moment (De Groot and van der Klaauw, 2017; Heyma, 2015; van Hooft and van den Hee, 2017). The second source is the input of colleagues, in other words, their practice-based knowledge and experience. The factors from Work Profiler 2.0 form the starting point of the Service Selection Tool, as these are the factors hindering reemployment that can best be targeted with services. For each specific job seeker, the caseworker obtains an overview of the factors which act to hinder this specific person, and for each factor has access to the sum of knowledge on what services are appropriate. The caseworker will additionally see whether the evidence for the services is based upon scientific research or colleagues' experience. The tool is tailored, meaning that since certain services are only effective for people of a certain age, educational level, or stage in their unemployment, it will only show those that are appropriate to their client.

To offer an example of the use of the Service Selection tool, the professional may see in the Work Profiler that the job seeker has a negative view about the return to work. The Work Profiler does not indicate the reason why. The professional will discuss the situation with the job seeker and will try to ascertain the reason. The Service Selection tool shows the most common reasons for a negative view on return to work (e.g., lack of job prospects in their sector, (health) problems, care responsibilities). If the professional establishes that the negative view stems from a lack of job opportunities, the Service Selection tool indicates for which services there is evidence that these could work in that situation. In this specific case, these may be services that help the job seeker to understand their competencies and to explore the value of these in other sectors of activity. The Service Selection tool should be used only as an aid – its use is not mandatory, and the professional is not obliged to follow its outcome.

Ultimately, and besides the expectation of quality, any tool is only as good as how it is used. Key to this is the professional's trust in the tool being able to perform the job at hand. Regular maintenance of the tool is thus part of reinforcing that trust. However, this is not sufficient. Building trust also involves training professionals about how to balance the outcomes of the tool with their own insights as well as with the job seeker's wishes. Lastly, the tool should address an actual need, such that the professional knows with confidence what to do to enhance job seekers' employment opportunities. A good example of this has been the addition of amenable factors in the Work Profiler, besides non-amenable factors. Amenable factors can inform on the socio-emotional and behavioural circumstances of the unemployed person. While most non-amenable factors have little influence on PES services, amenable factors offer more opportunities for action. In fact, many PES services mainly target amenable factors. Thus, the incorporation of amenable factors may increase accuracy of the model and increase the quality of the profiling tool, as it facilitates the caseworker to be better able to understand the job seeker's situation. This proffers vital information about how to aid the job seeker and how to decide upon which services to offer to enhance the job seeker's opportunities in the labour market.

As argued above, the theoretical embedding of factors is also important, especially for job seekers, as professionals need to understand what hinders a job seeker and how to overcome these by providing tailored services. The ability of the caseworker to understand the profiling tool has also proven crucial for acceptance, readiness to work with the tool, and being capable of using the insights the tool generates in the daily work tasks. We found that a foundation of theoretical constructs is very important in this regard. These allow the caseworker to understand what the factors mean and how they influence the probability for return to work. The understanding of the profiling model and its theories allow the professional to become aware of in what ways, as well as how, they can influence the job seeker (or his or her situation) with services to enhance the probability of reemployment. In a sense, the caseworker obtains a dashboard and becomes aware of how to tailor services to specific needs.

Providing job seekers with tailored support and services starts with a profile of the job seeker's situation, the next step is building on the knowledge of what services are effective for whom and at what moment. The caseworker discusses the outcomes of the Work Profiler with a job seeker and will try to enhance the job seeker's chances for reemployment through services.

Concluding comments

To conclude, a related aim of this article is to stimulate more transparency amongst those responsible for making profiling tools. The insights concerning how a

profiling tool works, especially which choices are made to make it function, are essential to its understanding. Not only is it necessary to know how well a model predicts, which is a key fact that few models publish information about (e.g., O'Connell, McGuiness and Kelly, 2012), but it is of value to have insights into the choices that led to this predictive outcome. One can and must make choices, such as regarding the type of analyses used and whether a tool's sensitivity or specificity was optimized. Sharing information on these choices will make it much easier to learn and understand whether a profiling model performs adequately and for which aspects enhancement is still required.

Transparency is also vital for job seekers, as it helps with the acceptance of, and trust in, the profiling tool. This concerns not only the prediction about work resumption, but the diagnosis offered by the instrument of the job seeker's personal situation. If the job seeker believes that the instrument, together with the actions of the professional, are keenly focused on their personal situation, then the PES can better target their services to enhance the job seeker's labour market position.

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Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of this article.

INTERNATIONAL
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BOOK REVIEW

Midgley, James. **Advanced introduction to social protection**. Cheltenham, UK, Edward Elgar Publishing, 2022. 136 pp. ISBN 978 1 80037 627 4.

In this very readable volume, Professor James Midgley provides readers with a thorough and comprehensive introduction to the field of social protection. This ambitious book starts by introducing and defining essential social policy terminology and offers a well-balanced short history of the evolution of social policies. In quick steps, the author leads the reader through an overview of theories and ideologies, the nature and extent of global poverty and the COVID–19 crisis. In turn, Midgley discusses the impact that politics and the electoral process have on growth and development and the constantly evolving concepts of socioeconomic equality and inequality. As a core element in this work, the book addresses the challenges and opportunities for expanding social protection in its multiple forms and calls for a rights-based approach to social protection, which recognizes access to basic social policies as a human right.

Of special interest is the section that discusses theories, values, and ideologies. Here we find Midgley's critical contribution to the developmental approach to social protection, which links social policies with economic development. The importance of this concept should not be underestimated because of the continuing struggle to achieve both improved social protection and economic and social development worldwide, and especially in the Global South. Midgley argues that adequately designed social programmes will contribute to economic development by increasing consumption, improving people's quality of life, expanding and strengthening formal employment, and reducing poverty.[1] However, what remains largely unresolved is the question of how to accomplish these tasks in an environment of limited or scarce resources, which is often dominated by corrupt politicians or influenced by ideologies that run counter to a more egalitarian distribution of wealth and resources. Regardless of the nature and extent of the obstacles, it is critically important to note that well designed social policies will make a meaningful contribution to socioeconomic development.

The question of poverty reduction lies at the core of contemporary international social and economic policy discussions. To what measurable extent social protection is responsible for the decline in absolute poverty and improvements in living standards seen over the last 20 years is a question with which James Midgley grapples in the book's fourth chapter. Poverty reduction is often not attributed to the implementation of social policies, but to major economic reforms that increased employment and wages, such as in the cases of the People's Republic of China and the Republic

1. An important argument made previously in: Midgley, J; Tang, K. (eds). 2008. *Social security the economy and development*. Hampshire, Palgrave McMillan.

of Korea. However, multiple studies also show that social protection has had a dramatic effect on poverty reduction worldwide and that the effect of policies, such as childcare benefits, conditional or unconditional cash transfers, among others, are substantial. Nonetheless, as noted in this book, generalizations are often detrimental because what we require are more nuanced studies that focus on the specific connections and interactions between social and economic policies and poverty reduction in a country or area. For instance, what are the effects that a conditional cash transfer policy has on consumption, access to health care, or access to education, or what is the impact of access to childcare on women's wages and gender equity?

Appropriately, this chapter also discusses the devastating impact of the COVID–19 pandemic and the policies adopted to respond to it. In many countries, both in Europe and the Americas, governments attempted to deal with these devastating effects through a variety of policies, including temporary increases in child allowances, pensions, and the provision of cash benefits. However, on average, as shown by Midgley, only 10 per cent of the population in the Global South was protected by special schemes to counter the pandemic's negative effects, which has been catastrophic for the poor.[2]

The book also delves into the impact of social protection on behaviour, equality, solidarity, and social cohesion. The question of the impact of social policy on behaviour and, by and large, on the economy is efficiently answered not by arguing that all social policies are beneficial, but by arguing that governments should monitor the impact of social policies on the economy and adjust them appropriately. However, as noted here and elsewhere in the vast literature on the Welfare State, the so-called Golden Age of the Welfare State brought immense prosperity to the countries that adopted those policies. Quoting a study by Lindert,[3] Midgley reaffirms that there is no empirical evidence to support the notion that high social spending hinders economic growth as argued by classical economic theory.

Regrettably, the lack of access to social policy in the Global South is not only the result of limited resources, but also a consequence of ideology, politics, and corruption. As regards ideology, this reviewer and many others have pointed repeatedly to the negative effects of the neoliberal/market-based approach, with the concomitant retrenchment of social policies, on poverty, health and mortality rates, as well as education, during the 1970s and 1980s. As for politics, the rise of populist leaders, when acting as the purveyors of false promises at the head of corrupt governments, may represent major impediments to social progress.

Midgley concludes with recommendations that add much value to the book and to the social protection field. Among these is the suggestion that governments should combine their commitment to a rights-based approach to social protection with policies that directly impact economic development, as well as the need for concerted international effort to eradicate global poverty by increasing aid allocations to social protection and to fulfil the Sustainable Development Goals.

2. "About 97 million more people are living on less than $1.90 a day because of the pandemic, increasing the global poverty rate from 7.8 per cent to 9.1 per cent; 163 million more are living on less than $5.50 a day". See: Sánchez-Páramo, C. et al. 2021. "COVID-19 leaves a legacy of rising poverty and widening inequality", in *World Bank Blogs* (7 October). Washington, DC, World Bank.
3. Lindert, P. H. 2019. *Welfare states: Achievements and threats*, New York, NY, Cambridge University Press.

In brief, James Midgley leaves us with a powerful message: it is never too late to adopt and follow the established principles of universality, solidarity and accessibility because these do contribute to improving the lives of peoples across the world.

Silvia Borzutzky
Book review editor
Carnegie Mellon University, Pittsburgh, USA

In memoriam

Warren McGillivray

1941–2023

It is with deep sadness that the International Social Security Association (ISSA) and *International Social Security Review* have learnt of the passing of Warren McGillivray.

For all who had the honour to know and work with him, Warren was a highly respected actuary and international civil servant who worked tirelessly for the international advocacy and advancement of social security. His intellectual weight and deep technical knowledge of social security, conveyed and shared with ease by calling upon a wealth of personal anecdotes and experience in the field, as well as his dry humour, left no one indifferent.

Warren was born in Saskatoon, in the Canadian province of Saskatchewan. Having received B.A. and M.A. (Math) degrees from the University of Saskatchewan, and subsequently having become Fellow, Society of Actuaries, and Associate, Institute of Actuaries, Warren's international career began in earnest when lecturing Statistics at the University of Dar es Salaam, United Republic of Tanzania, followed by a post as senior lecturer in Actuarial Science at the University of Lagos, Nigeria, from 1969 to 1975.

His career path was then to lead him to the International Labour Office (ILO) in Geneva, Switzerland, as senior actuary in the Social Security Department (1976–79). In turn, he was stationed in Bangkok, Thailand, as a regional adviser for Asia and the Pacific (1980–85), before becoming Head of the Actuarial Section of the Social Security Department (1985–89) and then Director of the ILO Office for the South Pacific, stationed in Fiji (1989–93).

While working for the ILO, and especially so while in Fiji, Warren assisted the national governments of developing economies to establish and implement social security systems. With the region having little to no experience with social security and no suitable models from the region they could copy, a vital part of this process was to mentor the officials of those systems. This was especially the case when Warren was director of the Fiji office. Warren invested greatly in helping officials to understand and carry out their roles as social security administrators.

A happy reunion occurred several years later, near the end of his professional activity, while he was undertaking an evaluation of work accident and occupational injury schemes in the Pacific islands for the ILO's Social Security Department. Finding himself once more in Fiji, Warren was to be reunited with

the officials he had mentored in the late 1980s, and who had now risen to become the heads of their respective social security schemes. He was thus to witness at first hand their good work, in what were often difficult circumstances. Warren, in his characteristically modest fashion, would of course not have taken any credit for these achievements. Those others who observed and participated in this reunion would most likely have considered his influence otherwise.

Warren joined the General Secretariat of the ISSA in Geneva, Switzerland, as Chief, Regional Activities Branch on 1 October 1993. In February 1997, following an internal structural reorganization, he became Chief of a newly created Studies and Operations Branch, which combined the previous activities of Regional Activities, Technical Activities and Research. He would remain in this lynchpin senior position, contributing to further advance the international role and technical reputation of the ISSA under the leadership of Secretary General Dalmer D. Hoskins, until leaving the ISSA on 31 December 2004.

Warren's contribution to the development of the international role of the ISSA during his years of tenure was decisive. He was to help direct the Association's ambition to widen and deepen its role in the development of social security, moving from dealing primarily with analysing and supporting the evolution of existing social security arrangements to also foster their enhanced performance to improve the well-being of populations worldwide. Underpinning this ambition was an understanding that "social security", both as a means and an end, was nested deeply in the economic and political realities of nation States. Fittingly, when the new ISSA Constitution was adopted in 1998, it included the following guiding amendment for the Association's future modus operandi, promoting the development of social security worldwide: "in order to advance the social and economic conditions of the population on the basis of social justice". This shift to pair the ISSA's conventional technical role with one of championing the promotion of the social security of populations (at that time, epitomized by the ISSA's slogan: "No lasting peace without social justice; No social justice with social security"), and to encourage the leaders of national social security administrations to actively support and engage with this, was one that suited Warren well.

In concrete terms, the ISSA's change of tack was evidenced by three core mission objectives, for each of which Warren played a directing and facilitating role. One was the decision to engage more systematically than hitherto had been the case with ISSA member organizations beyond the frontiers of Europe. A second was to actively participate in the international debate on the future of social security. As Warren remarked during a CARICOM social security event in 1994, this was necessary because attacks on social security, based on superficial analysis and an incomplete understanding of social security, had become more insidious. Also, the negative impact of IFI structural adjustment policies on ISSA member

organizations in many developing countries, not least in Africa, necessitated a strong response from the ISSA. The third mission objective, initiated in the 1990s, was to create a special programme to support the previous Soviet-bloc countries of Central and Eastern Europe.

Across his long international career working for the ILO and the ISSA, and over and above performing routine management duties, Warren was frequently on mission, undertaking numerous social security advisory country missions and participating in international and national projects involving financial studies, actuarial valuations and various aspects of social security policy and planning. It is fair to say that he was very highly regarded and respected in all corners of the globe.

On leaving the ISSA, Warren returned to his country of birth, Canada, remaining scholarly active as a Policy Associate with the Caledon Institute, Ottawa.

He was the author of numerous scholarly articles and contributions to technical books on social security financing and actuarial topics. An article of lasting influence, co-authored with Roger Beattie, "A risky strategy: Reflections on the World Bank Report Averting the old age crisis", was published in the pages of this journal (Vol. 48, No. 3–4) in 1995. The article was one of the earliest published works to offer a powerful but balanced rebuttal of the World Bank's pension privatization agenda and its seminal three-pillar pension model. While acknowledging the various problems facing pension schemes, the article concluded firmly by advocating for a more methodological approach to address system design challenges and inequities. Nearly three decades later, this article continues to attract scholarly interest as a key reference source. This joint work was followed, in 1996 (Vol. 49, No. 3), by a "Rejoinder" (again penned with Roger Beattie) that offered an impressive analysis of why the World Bank pension agenda could not be accepted. Another important work published in this journal, in 2000 (Vol. 53, No. 1), was "Pension reform: Where are we now".

Amongst his wider published works, also of lasting importance is the joint ILO–ISSA technical publication from 2002, *Actuarial practice in social security* (Quantitative Methods in Social Protection Series), co-authored with Pierre Plamondon, Anne Drouin, Gylles Binet, Michael Cichon, Michel Bédard and Hernando Perez-Montas. The main objective of this work was to provide a lasting practical tool, a step-by-step guide, for actuaries involved in the valuation of social security schemes.

As another facet of his research activities, he was also a distinguished and much respected member of the ISSR Editorial Board who contributed in no small measure to the development of the journal during a period (January 1997 until March 2008) marked, amongst other policy issues, by the threat to social security arising from neoliberal endeavours to weaken public old-age pension provision, and thus the philosophical case for, as well as the applied practice and valued roles of, social insurance, risk sharing and solidarity.

Warren lived fully his professional life as a social security actuary, international civil servant, and scholar. He was deeply committed to the conventional values of social security, and his work sought to contribute to ensuring the sustainable functioning of social security and its good governance. For his career-long contribution, in supporting social security schemes worldwide to pursue the necessary progress towards attaining these objectives, he will be remembered.

He will be fondly remembered also for being excellent company, sociable, generous, as someone who encouraged professional development and kept a benevolent (smiling) eye open for younger colleagues, as well as being a man who loved to share a good joke.

Warren is survived by his spouse Linda, son Douglas and daughter Catherine.

Karl Gustaf Scherman (Former ISSA President), Edward Tamagno (Former ISSA Treasurer) and Roddy McKinnon (ISSR Managing editor)