IEB Institut d'Economia de Barcelona

IEB Working Paper 2024/12

DO PUBLIC WORKS PROGRAMS FOSTER CLIMATE RESILIENCE? CONCEPTUAL FRAMEWORK AND REVIEW OF EMPIRICAL EVIDENCE

Elisabetta Aurino, Francesco Burchi, Tekalign Sakketa, Anastasia Terskaya

Version July 2024

Public Policies

IEB Working Paper

Do public works programs foster climate resilience? Conceptual framework and review of empirical evidence

Elisabetta Aurino, Francesco Burchi, Tekalign Sakketa, Anastasia Terskaya

Postal Address:
Institut d’Economia de Barcelona
Facultat d’Economia i Empresa
Universitat de Barcelona
C/ John M. Keynes, 1-11
(08034) Barcelona, Spain
Tel.: + 34 93 403 46 46
ieb@ub.edu
http://www.ieb.ub.edu

IEB Working Paper 2024/12

DO PUBLIC WORKS PROGRAMS FOSTER CLIMATE RESILIENCE? CONCEPTUAL FRAMEWORK AND REVIEW OF EMPIRICAL EVIDENCE*

Elisabetta Aurino, Francesco Burchi, Tekalign Sakketa, Anastasia Terskaya

ABSTRACT: Public works programs (PWPs) are among the most used social protection instruments in low- and middle-income countries. While their impacts on poverty, food security and labor outcomes have been increasingly examined, there is a notable lack of systematic theoretical and empirical research focusing on their effects on climate resilience. To fill this gap, we began by developing a conceptual framework that links the different components of PWPs—wages, infrastructure, and skills development—to household capacity to cope with, and adapt to, weather shocks. After that, we used this framework to guide the review of empirical evidence on the multiple short- and long-term effects of PWPs on resilience to weather shocks, such as flood, drought, and cyclones. Overall, our review suggests that, through the wage component, PWPs can be effective in enhancing resilience, especially by increasing savings and investments in productive assets. However, these benefits usually only materialize in regular, long-term programs. The infrastructure component can be crucial in supporting households' long-term capacity to adapt to shocks, especially given the recent focus on climate-smart infrastructures. Moreover, the positive effect of infrastructure may not be limited to the direct program beneficiaries but extend to the whole community in which PWPs are implemented. However, it is necessary to highlight that most of the evidence focuses on only a few programs and countries and relies on non-optimal—often cross-sectional—data. In particular, the empirical literature investigating the impacts of the infrastructure component of PWPs on both beneficiaries and other community members, especially that carried out through experimental and quasi-experimental methods, is scarce. Another critical research gap concerns the role of on-the-job training and its capacity to strengthen resilience in combination with the infrastructure/service component. Therefore, more research is needed in these directions. Only with adequate information on the overall impacts on different members of the society, and on the channels through which these effects materialize, can policymakers take decisions about when to implement PWPs, and how to design them.

JEL Codes: I38, J48, Q54
Keywords: Public works program; climate resilience; social protection; climate adaptation; low- and middle-income countries.

Elisabetta Aurino
Universitat de Barcelona & IEB

Francesco Burchi
German Institute of Development and Sustainability (IDOS)

Tekalign Sakketa
German Institute of Development

Anastasia Terskaya
Universitat de Barcelona & IEB
and Sustainability (IDOS)

*The authors would like to thank in particular Stefan Beierl for his useful comments on an earlier version of the paper. This research is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), within the IDOS research project "Fostering Resilience through Health and Social Protection in times of multiple crises".

1. Introduction

Climate change causes, among other things, an increase in the incidence and severity of extreme weather events, such as floods, droughts, wildfires, or heatwaves (IPCC, 2018). Households in low- and middle-income countries are especially affected by weather shocks due to their high reliance on the agricultural sector as a key source of income and to their limited access to credit and insurance markets (Dercon & Christiaensen, 2011). The adverse effects of climate change on employment and livelihoods, whether through direct or indirect channels, exacerbate existing economic and social inequalities for vulnerable populations, thereby amplifying their susceptibility to life-cycle risks (Lambeau & Urban, 2021). Notably, climate-related hazards resulted in an annual loss of 23 million working-life years between 2000 and 2015, especially among vulnerable groups (ILO, 2018). Identifying strategies that promote households' resilience to weather shocks, both by enhancing their ability to *cope* with shocks once they materialize as well as their ability to *adapt* to future shocks, is, therefore, a key global challenge and policy priority.[1]

Social protection can play a crucial role in mitigating the impacts of weather-related shocks (Bowen et al., 2020; Costella et al., 2023). In particular, public works programs (PWPs) carry a great potential. PWPs—also known as labor-intensive employment, workfare, or cash-/food/input-for-work programs—are among the most common forms of social protection globally, with over 90 countries implementing them (World Bank, 2018). They are government- or donor-led initiatives, which offer temporary employment opportunities to people usually living in poor or vulnerable areas (Subbarao et al., 2013). PWP beneficiaries usually engage in labor-intensive activities related to the construction or maintenance of public community infrastructures or to the provision of other public services: in exchange for their work, people receive compensation either in cash or in kind (often food).

[1] In Section 2, we present a comprehensive definition of resilience.

These programs can support households in withstanding and recovering in the face of shocks in the shorter run by offering income support, as well as by promoting longer-term resilience to climate change and allowing them to take advantage of potential opportunities through assets, infrastructure, and skills development. Since they can be used to create climate-smart community assets or provide climate-smart services (e.g., afforestation, land rehabilitation, river walls, etc.)—which is increasingly often the case—, PWPs can affect climate resilience through more channels than other social protection schemes, such as unconditional cash or food transfers (Beierl, 2021; Godfrey-Wood & Flower, 2018; Beazley et al., 2016). It is likely not by chance that the world's two largest PWPs—India's Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and Ethiopia's Productive Safety Net Program (PSNP)—were initiated as a public response to two large drought shocks (Bagga et al., 2023). Despite the considerable potential of PWPs to enhance resilience to weather shocks during and in the aftermath of program implementation, there is a lack of a systematic set of theoretical and empirical research. First, despite their potential role in promoting resilience to climate shocks, the inclusion of PWPs within academic or policy debates at both global and national levels is currently limited (Costella et al., 2023), and there is a vague conceptual understanding of how such inclusion might play this role.. Second, while PWPs can offer short-run consumption smoothing at times of shocks if certain conditions are satisfied (Beazley et al., 2016), data on their average and distributional effectiveness are limited and mostly related to India and Ethiopia. Third, there is a lack of knowledge regarding the capacity of these programs to sustain the anticipatory and adaptive capacity of households and communities to future weather shocks through assets, infrastructure, and productive skills development channels. In particular, there has been a paucity of attention devoted to the infrastructure channel: this is especially critical because this channel represents the main difference between PWPs and cash transfers. Finally, our understanding of the mechanisms and program design features through which PWPs can support resilience-building in different contexts remains relatively limited. These constitute significant evidence gaps for policy design, given that (i) PWPs are pervasive; (ii) PWPs are relatively costly, in comparison to other social protection tools (e.g., cash transfers); and (iii) weather shocks are likely to become more frequent and intense due to climate change.

This paper attempts to bridge these gaps by, firstly, proposing a sound diagrammatic conceptual framework, which links the different components of PWPs to households' different (resilience) *capacities* to deal with current and future weather shocks; and by, secondly, providing a review of the existing empirical evidence of the multiple (short-run and long-run) effects of PWPs on resilience to weather shocks, guided by our conceptual framework.

2. Conceptual framework: the link between public works programs and climate resilience

Given the general definition of PWPs provided in the introduction, before discussing the conceptual framework, it is necessary to clarify what we mean by climate resilience. We define resilience to climate shocks as the capacity of a social system to cope effectively with a hazardous event, responding in a way that preserves its basic function, identity, and structure, while maintaining the capacity to adapt. Bowen et al. (2020) and Badahur et al. (2015) define resilience as a two-pronged concept encompassing the capacity to cope with, and adapt to shocks. This concept includes at least two key aspects: capacity to cope, and capacity to adapt (Béné et al., 2012; Beazley et al., 2016). Others add a third component—a transformative capacity (Béné et al., 2015; Sengupta & Costella, 2023). *Capacity to cope* refers to the ability to withstand and recover from a climate-related shock, while *capacity to adapt* refers to the ability to adjust to potential damage, take advantage of opportunities and cope with consequences, and entails reducing long-term exposure to risks as well as learning to adjust after a shock to reduce vulnerability to the same shock in the future. Both resilience capacities focus on ex-post recovery from the shock, while we focus mostly on the role of PWPs in fostering resilience to climate-related shocks in the short and medium run. The concept of resilience to weather shocks encompasses multidimensional and dynamic processes involving household, community, and system preparedness, response, recovery, adaptation, and transformation in the face of weather shocks and stresses. To characterize the role of PWPs in fostering resilience, we define short-term effects as those that occur during or immediately after a shock; while mid-term effects refer to program impacts after the program has ended.

The relationship between PWPs and climate resilience is complex: the way in which such programs can ensure resilience to shocks is highly contextual, and the pathways through which this might occur vary greatly depending on the specific setting in which the program is implemented. Nevertheless, we think it is possible to develop a general (although non-exhaustive) conceptual framework, which illustrates the main pathways through which PWPs can contribute to building resilience at different scales (individual, household, and community), and at the same time may help to identify the key indicators to be used to measure program effectiveness (see Figure 1).

First of all, in line with the existing literature (e.g., Beierl, 2021), we argue that PWPs may contribute to fostering climate resilience through three key components: wages; infrastructure development/service provision; and skills development. This framework also presents the intermediate outcomes that these three intervention components may produce, which are proxies for the two resilience capacities, and how they relate to the final outcome, i.e. climate resilience. While it is not always easy to associate a specific indicator to one or the other resilience "capacity" and while, in the literature, there is no full consensus, we do identify some proxy measures. An increase in savings is considered primarily a proxy for coping (or absorptive) capacity (Bowen et al., 2020; Béné et al., 2015; Beazley et al., 2016)[2]; the same applies to an increase in productive assets or, more in general, a reduction in the use of extreme coping strategies (Bowen et al., 2020; Béné et al., 2015; Beazley et al., 2016; Sengupta & Costella, 2023). Indicators of adaptive capacity, instead, are livelihood diversification (Sengupta & Costella, 2023; Bowen et al., 2020; Beazley et al., 2016; Béné et al., 2015); adoption of climate-smart technology (Sengupta & Costella, 2023; Bowen et al., 2020; Béné et al. 2015); and long-term investments in productive assets (Bowen et al., 2020; Beazley et al., 2016; Béné et al. 2015).

Furthermore, we discuss below factors and processes that explain how and why the program leads to a particular outcome, as well as mediators that influence the strength, success, or direction of the relationship between an intervention and its outcomes. Although not all explicitly shown in Figure 1, they play a crucial role in shaping the effectiveness of PWPs on resilience.

The first intervention component of PWPs involves the provision of a wage.[3] This wage enhances the coping capacity by improving access to food and/or avoiding detrimental consumption smoothing strategies (Hadley et al., 2023), enabling savings, preventing distress selling, and/or investing in productive assets (Dercon & Christiaensen, 2011; Hidrobo et al., 2018), as well as enhancing livelihood diversification (Barrett et al., 2021). We refer to these outcomes as intermediate outcomes. Regarding the enhancement of adaptive capacity, wage payments allow for investment in productive assets, such as investment in agricultural inputs and capital, which increase productivity and/or diversify livelihoods to be less vulnerable to climate shocks. This enables beneficiaries to move out of the least well-remunerated forms of casual labor, which are typical features of employment in PWPs. In addition, enabled savings

[2] As an exception, Sengupta and Costella (2023) connect savings more to the adaptive capacity.

[3] The term "wage" here also includes in-kind (especially in-food) remuneration for public works engagement.

as a result of cash transfers can increase adaptive capacity, although this effect may be weak (indicated in Figure 1 by a dashed-line). For instance, cash transfers may enable participating households to increase their saving capacity, access loans, self-employment, or engage in riskier investments, as it has been shown in the case of the MGNREGA in India (Zimmermann, 2020).

The extent to which a wage impacts/improves these intermediate outcomes—and hence the capacity to cope—depends on the size of transfer (whether the transfer amount is adequate to induce change or meet consumption needs); on regularity reliability and the frequency of payments; as well as on whether the number of days a beneficiary works is sufficient to have a significant impact; moreover the timing of employment should take into account seasonal variations in food security and labor market demand. For example, if access to PWPs remains consistently reliable, participants are likely to be in a position to decrease precautionary savings and invest in more productive investments, thereby enhancing their adaptive capacity. In addition to these prerequisites, improving the adaptive capacity component of resilience requires that wage levels be sufficient to encourage or induce investment in productive inputs and capital and/or livelihood diversification.[4] This underscores that—as with any other social protection tool – program design and implementation are key.

The second intervention component relates to infrastructure creation and/or service provision. The provision of public goods is a major feature of PWPs which distinguishes them from cash transfers and is a key mechanism through which PWPs can enhance household resilience to weather shocks. Subbarao et al. (2012) categorize goods and services created by PWPs into two types: infrastructure (e.g., road reconstruction after weather shocks or afforestation) and land management (e.g., soil conservation projects). While both types of PWPs may result in

[4] At the same time, wages should be below market wages, and in general not too high: otherwise, people in the middle class may also be incentivized to participate, although PWPs are meant to reach the poor.

public goods provision that can mitigate the effects of shocks and increase resilience (for example, through rainwater and harvesting systems, roads, etc.) and other infrastructure and service provision (Asher & Novosad, 2020), it is likely that PWPs focusing specifically on climate-smart infrastructure, such as afforestation and land rehabilitation, may yield larger impacts on climate resilience than other types of infrastructure and service provision (Bagga et al., 2023). Over the last years, more and more countries have provided the above services within PWPs with the specific objective of reducing vulnerability to different kinds of weather shocks, such as floods, drought, cyclones, or hurricanes as well as other consequences of unsustainable land use, such as soil erosion and degradation. Among them, it is worth mentioning programs in Ethiopia, India, Rwanda, Madagascar, Haiti, Malawi, Indonesia and Pakistan (Subbarao et al., 2012; Adam, 2015; Godfrey-Wood & Flower, 2018). Therefore, not surprisingly, the impact of PWPs on the coping and, even more so, on the adaptive capacity through the infrastructure component depends on the type of infrastructure/service.

One intermediate outcome of the infrastructure creation and service provision component of PWPs is the adoption of climate-smart technologies. Climate-smart agriculture (CSA) practices, such as conservation agriculture, agricultural diversification, and improved seed use, have been widely promoted in many African countries. However, their success has often been limited, due to high direct (especially financial) costs and indirect (both financial and non-financial) costs (Amadu et al., 2020). Hence, PWPs may induce households to adopt CSA practices by easing budget constraints, as demonstrated in some regions of Malawi. This, in turn, may enhance agricultural productivity and climate resilience (Scognamillo & Sitko, 2021). These technologies can increase the capacity to adapt and cope with climate change. For example, the adoption of drought-resistant crop varieties can make farming more resilient to water scarcity, allowing farmers to maintain, or even increase, crop yields during drought periods. Planting resilient crops can help mitigate the risk of crop failure during droughts, reducing vulnerability to income loss and food insecurity. Additionally, adopting climate-smart approaches can improve sustainable resource use and productivity. For example, drought-resistant crops often require less water and fewer inputs such as pesticides and fertilizers, promoting more sustainable agricultural practices and reducing environmental degradation. This can lead to stable incomes and food security, enhancing their overall resilience to climate shocks. By adopting climate-smart technologies such as drought-resistant crops, farmers can increase their yields and reduce the risk of crop failure (Taraz, 2023). Additionally, these technologies can help build farmers' adaptive capacity to future climate variability and extremes, rendering them better equipped to withstand and recover from climate shocks, ultimately improving their long-term resilience. However, given wide underemployment in the rural areas of low- and middle-income countries, especially in the lean seasons when many of the PWPs are implemented, these links are somewhat unrealistic.

The creation of infrastructure and the provision of services through PWPs has an additional intermediate outcome that can enhance adaptive capacity: this outcome is related to the knowledge and practices on watershed management.

Just like wages, the impact of interventions is highly dependent on the relevance, quality, and functionality of the infrastructure and/or services created. It is crucial that these infrastructures are tailored to local needs, that they are labor-intensive, and that they are provided with adequate technical inputs during design, implementation, and maintenance. Additionally, it is important to ensure the local government and community ownership of these infrastructures. The sustainable functionality of these infrastructures often requires regular monitoring and follow-up maintenance. Moreover, given the nature of public goods, PWPs interventions can generate positive spillovers on non-beneficiary households within communities, a point to which we will return later.

The third component of PWPs is skills development. Indeed, PWPs interventions are often combined with on-the-job training or broader training initiatives. Both have the potential to enhance resilience by increasing adaptive capacity and, to some extent, also coping capacity. In particular, training activities on CSA practices and disaster preparedness trainings, livelihoods diversification, and extension services are often promoted to ensure specific skills that can enhance households' adaptive capacity. Such interventions aimed at building human capital can possibly have long-run effects on labor market outcomes such as on wages, employability, and the intensity of labor participation, including productivity. Skill development is a key theoretical advantage of PWPs compared with cash transfers. However, given that many of the activities undertaken in PWPs are generally low-skill and short-term, it is hard to evaluate the degree to which the quality of skill acquisition and transferability occurs in practice (Gehrke & Hartwig, 2018). Furthermore, while PWPs are often undertaken in rural areas or humanitarian settings, they now increasingly target urban or peri-urban settings, such as in the case of Ethiopia (Franklin et al., 2024). Variation in employment opportunities between urban and rural areas or across humanitarian settings may influence the degree to which on-the-job training can lead to long-term employability and subsequently resilience to future shocks.

Several factors determine whether skills development interventions for PWPs would enhance capacities to cope or adapt. These factors include: 1) alignment of the training with the local context and resilience; 2) availability of resources to enable beneficiaries to use the acquired skills; 3) demand for the acquired skills; and 4) labor market conditions, among others (McCord et al., 2016; Bertrand et al., 2017; Solórzano & Cárdenes, 2019; Beierl, 2021). Finally, it is important to highlight that, unlike the first two components, skills development is complementary and non-mandatory. Moreover, even where training does take place, it may be difficult to disentangle the specific effect of this component from that of wage or infrastructure.

For all these reasons, our review of the evidence on this specific component – which is directly structured around this conceptual framework – is shorter.

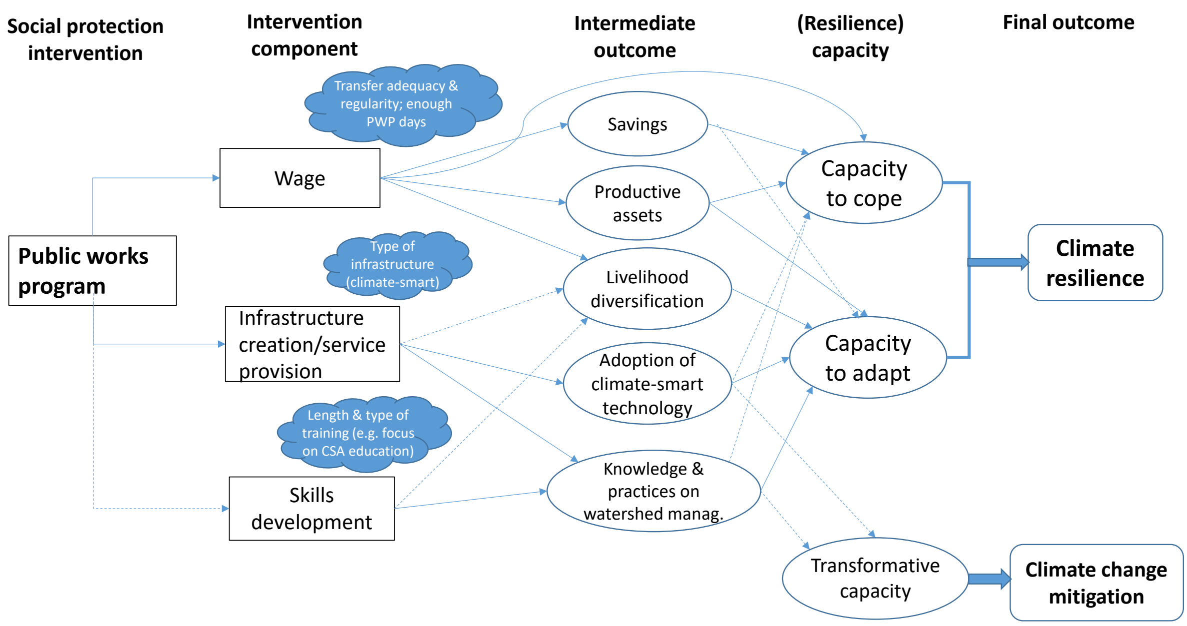
The three intervention components can affect not only the resilience of the beneficiaries but also that of the community as a whole. For instance, PWPs may improve health access through road rehabilitation or agricultural productivity by adoption of climate smart technology. Moreover, the injection of considerable amounts of cash or food into targeted communities may lead to several general equilibrium effects on local wages, prices, and overall economic activities such as trade, production, and income diversification (Loewe & Zintl, 2023). By providing access to public infrastructure, such as roads, and dams, PWPs make users less vulnerable to climate shocks. This is often referred to in the literature as spillover effects (Gazeaud et al., 2019). Altogether, these aggregate effects may shape the overall extent through which PWPs can foster resilience to weather shocks. Spillovers or the multiplier effects of PWPs are often neglected and less explored in the social protection literature, specifically in relation to resilience to climate shocks.

For instance, with regard to wages, the competition induced by a program with private sector jobs may push local wages up, as has been documented in the case of the MGNREGA in India (Imbert & Papp, 2015; Muralidharan et al., 2018; Zimmermann, 2020) and Ethiopia's Urban PNSP (Franklin et al., 2024). Such increases in equilibrium private sector wages can lead to substantial decreases in poverty, as well as to large aggregate welfare gains in relation to the gains received solely by program participants. In Ethiopia, these welfare gains to the poor are six times larger when they include spillovers onto private sector wages and local amenities (Franklin et al., 2024). However, such an increase in wages may also affect local prices, with potential detrimental effects on food and non-food consumption. Based on the evidence from cash transfers in Mexico, local effects on prices may also depend on the type of transfer (e.g. food versus cash) and the degree of market-connectedness of the communities involved (Cunha et al., 2018). Theoretically, increases in wages may also reduce the local demand for labor among non-participants in the private sector (Bagga et al., 2023).

The spillover effects of PWPs are even more evident in the case of the creation of some climate-smart infrastructures, as both beneficiaries and non-beneficiaries living in the community can make use of them. Finally, program participants can share their skills and knowledge as well as resources with other community members (non-beneficiaries), further contributing to community resilience (Angelucci & De Giorgi, 2009).

Last but not least, in Figure 1 (bottom-right) we mention the potential "transformative" effect of PWPs in terms of climate change mitigation. Theoretically, PWPs can be used to generate activities (such as planting trees, which reduce pollution), whose effect can reach beyond that of climate resilience and directly affect the very likelihood that extreme weather events happen. However, though important, the link is not a strong one—thus, marked by dashed lines—and has been rarely investigated empirically: for this reason, it will be discussed only in a few cases in Section 4.

Figure 1: Conceptual framework linking PWPs to climate resilience



Source: Authors' conceptualization

Notes: a) Clouds indicate the key design and implementation features of the specific PWP components. They influence the relationship between the specific intervention component and intermediate outcomes; b) Filled arrows indicate assumed strong relationships, while dashed lines indicate weaker relationships.

3. Methodology

Over the last years, there have been a few studies reviewing the impacts of PWPs (Gehrke & Hartwig, 2018; Sakketa & von Braun, 2019; Beierl, 2022; Bagga et al., 2023). These comprehensive works, however, have not had a specific focus as they drew attention to all possible outcomes. Our objective, on the other hand, is to synthetize evidence on the specific effects of this social protection instrument on a more neglected set of outcomes, namely those related to climate resilience. The conceptual framework presented above guides this exercise. First, we looked for empirical studies that examined the direct impact of PWPs on resilience, without specifying whether this materialized through the enhancement of the coping or the adaptive capacity. This meant selecting those studies that examined whether PWPs had buffered the negative effects of climate shocks (such as floods, droughts, or earthquakes) on key outcomes such as poverty, consumption, productivity, and food security. Then, we looked at empirical studies of the impacts of PWPs on proxy indicators of capacity to cope with shocks under *normal* conditions (i.e., not in relation to shocks). As previously stressed, indicators included savings; the use of extreme coping strategies; and ownership of productive assets. Finally, in a similar way, we reviewed the studies that focused on PWPs' effects on proxy indicators of adaptive capacity, such as adoption of modern technologies, knowledge and practices related to climate-smart agriculture, diversification of income-generating activities, and diversification of livelihoods in general. At the same time, though it is not always easy to do so, we distinguished the above impacts according to the specific component—wage, infrastructure, or skills—that had triggered them. Section 4 reviews the evidence, firstly according to program component, and then according to type of outcome. To assess the effects through the infrastructure component, we decided to focus only on those that were more directly related to climate resilience, i.e. climate-smart infrastructure and roads.[5]

We searched for the relevant literature in major bibliographical databases, including Google Scholar and the International Initiative for Impact Evaluation (3ie). Our primary focus was on the effects of PWPs, and therefore, we included "public works programs", "cash for work", "food for work", and "workfare programs" as key terms in our search. As we focused on the linkages between PWPs and weather shocks, we integrated two types of evidence into our analysis. The review of the empirical evidence relied almost entirely on quantitative studies. Wherever possible, we used studies employing experimental and quasi-experimental methods as they allowed us to better estimate the causal effects of PWPs. In a few cases, especially to integrate the rather limited experimental and quasi-experimental evidence of program effects through the infrastructure and the skills development components, we also considered studies that used more descriptive quantitative methods or even qualitative methods. Finally, we focused only on low-income and lower-middle-income countries, as defined by the World Bank's 2023 income classification.

Table 1: Summary of the PWPs reviewed in this paper

Country	Program	Period
Comoros	Social Safety Net Project (SSNP)	2016-2018
Côte d'Ivoire	Emergency Youth Employment and Skills Development Project (PEJEDEC-THIMO)	2013-2014
Djibouti	Urban Workfare Programme	2014-2015
Democratic Republic of Congo	Eastern Recovery project (STEP) programme	2016-2018
Egypt	The Emergency Labor Intensive Investment Project (ELIIP)	2015-2017
Ethiopia	Productive Safety Net Programme (PSNP)	2005-present
India	Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)	2007-present
Laos	Road Maintenance Groups Program (RMG)	2018-2020

[5] This does not mean that other infrastructures, such as health facilities, cannot have an impact on climate resilience. However, the causal chain is longer, and the potential effects may materialize only in the long term.

Malawi	Malawi Social Action Fund (MASAF)	1990-present
Mozambique	Productive Social Action Programme (PASP)	2012-present
Nepal	Karnali Employment Programme (KEP)	2006-present
Rwanda	Vision 2020 Umurenge Programme (VUP)	2008-present
Sierra Leone	Youth Employment Social Support Project/Cash for Work (YESP/CfW)	2012-2015
Somalia	Cash for Work (CfW)	2011-ended
Tunisia	Community Works and Local Participation (CWLP) pilot	2015
Uganda	Northern Uganda Social Action Fund (NUSAF-3)	2015-2020
Yemen	Labor Intensive Works Program (LIWP)	2005-present

Source: Authors' own compilation

Table 1 provides a description of the programs considered in our review. Although we did not exclude or prioritize any evidence after applying the criteria described above, it is important to note that most of the evidence in this review is derived from two large-scale regular programs: India's MGNREGA and Ethiopia's PSNP. The rest of the programs were mostly ad hoc or temporary, hence some results might not be generalizable to other PWPs or other settings.

4. Empirical evidence

4.1. The wage component of PWPs

Several studies have investigated the capacity of PWPs to buffer the negative effects of weather shocks on household expenditures and other outcomes. We started our review using long-term PWPs that provided predictable employment, such as the Ethiopia, and employment guarantee programmes, such as the one in India.[6] Knippenberg & Hoddinott (2019), Dasgupta & Robinson (2021), and Scognamillo et al. (2024) have examined the influence of Ethiopia's PSNP on the food security and vulnerability to droughts among beneficiaries and communities. All three studies found that PSNP participation reduced the adverse impacts of negative

[6] Both Ethiopia's PSNP and India's MGNREGA provide a substantial number of workdays per year (100 and 72, respectively) and employment opportunity for several years. One important difference between the two programs is that while MGNREGA guarantees employment to anyone demanding for that (self-targeting), PSNP reaches only households that are formally targeted, and therefore benefits always the same households until re-targeting takes place.

weather shocks on food security in Ethiopia. Scognamillo et al. (2024) used multiple waves of a nationally representative household survey and applied an instrumental variable approach to address the endogeneity of selection in the PSNP. To differentiate between the effects of the program after droughts and its effects during other crises, the authors defined their dependent variables by using self-reported reasons provided to explain agricultural and food security difficulties. They specifically differentiated between distress caused by droughts and distress caused by other shocks. The study showed that PSNP beneficiaries were *less likely* to experience food insecurity and harvest losses following droughts. No significant impacts were identified when households reported stresses unrelated to droughts.

A prior work conducted by Knippenberg & Hoddinott (2019) employing a similar identification as Scognamillo et al. (2024) founds that drought shocks led to a reduction in the number of months during which a household perceived itself as food secure. Importantly, these impacts lasted for up to four years following the drought. Additionally, PSNP payments mitigated the initial impact of drought shocks by 57 % and *completely eliminated* their adverse effects on food security within a span of two years. Dasgupta & Robinson (2021) found qualitatively similar results but did not account for endogeneity in program participation. In contrast, an earlier study by Béné et al. (2012) that used propensity score matching to account for non-random selection into the program, did not find that PSNP recipients were less affected by droughts or other weather shocks in terms of food security.

The study conducted by Ajefu & Abiona (2019) focused on the effects of the Indian MGNREGA, a large-scale PWP that guaranteed employment for 100 days per year, on mitigation of the effects of weather shocks. The study applied a difference-in-differences (DiD) approach to study the effect of weather shocks (positive “wet” shocks and negative “dry” shocks) on labor and schooling outcomes and the role of the MGNREGA. The study shows that the MGNREGA decreased the adverse effects of dry rainfall shocks on labor supply.

Specifically, the results suggested that in villages not exposed to the MGNREGA, one-standard deviation negative rainfall shock decreased the village employment rate by an average of 4.2 percentage points, while in the villages exposed to the MGNREGA, the effect of negative rainfall shock on employment rate was positive and not statistically significant. This mitigation effect was similar for men and women. These findings reaffirm the active role of the MGNREGA in creating additional employment opportunities during climate shocks that pose a threat to rural areas. However, the study also showed that the MGNREGA could also increase child labor especially during periods of "wet" shocks.

Some studies also examined whether participation in PWPs mitigated the impact of weather shocks through its effects on agricultural productivity (Daidone & Fontes, 2023; Gazeaud & Stephane, 2023; Rosenzweig & Udry, 2014; Taraz, 2023). Taraz (2023) empirically addressed this question within the context of the Indian MGNREGA and found evidence that the MGNREGA actually *exacerbated* the adverse effects of low rainfall on yields. The explanation of this result was that, by increasing labor demand, the MGNREGA created higher agricultural wages that were less elastic with respect to weather shocks, which in turn could reinforce the negative effect of weather shocks on agricultural production. The findings of Rosenzweig & Udry (2014) for the MGNREGA were also consistent with this labor market channel since they showed that the implementation of the MGNREGA was associated with increases in harvest-stage wages, particularly in years with bad rainfall shocks. Importantly, Taraz (2023) showed that, for households with marginal landholdings, the benefits from MGNREGA payments surpassed the MGNREGA-induced yield losses. However, for households with medium or large landholdings, the MGNREGA-induced yield losses could outweigh the anticipated benefits from MGNREGA payments in years with low rainfall. Tiwari (2022) used quasi-exogenous variations in yearly weather and compared those effects of weather shocks before and after the introduction of the MGNREGA. The results indicated increased crop yield volatility after the implementation of the MGNREGA, coupled with additional yield losses of 8% during a year of insufficient rainfall, attributed to increased labor costs.

Consistently, Daidone & Fontes (2023) reported a negative association between the Ethiopian PSNP and agricultural productive efficiency, especially when confronted with adverse shocks. In contrast, Gazeaud & Stephane (2023) did not find any discernible differential effect of the PSNP on agricultural productivity during periods of negative rainfall shocks.

Several studies analyzed the impact of the PSNP on livestock holdings (Andersson et al., 2011; Devereux & Guenther, 2007) within the context of weather shocks. Andersson et al. (2011) found that PSNP participation did not seem to assist households in coping with significant climatic shocks, as they tended to sell livestock due to a lack of alternative income sources. Similarly, Devereux & Guenther (2007) suggested that, during critical shocks or the hungry season, the PSNP did not prevent many households from selling productive assets.

So far, the majority of studies estimating the interaction between PWPs and weather shocks indicated that PWPs mitigated the adverse effects on household labor supply and food security. This suggests that the wage component of PWPs can enhance the coping capacity of households. On the other hand, most evidence indicates that PWPs may exacerbate the negative impact of climate shocks on agricultural productivity, potentially by producing a labor market distortion effect, and that they do not prevent households from selling productive assets during negative wealth shocks, which may limit the coping capacity of households.

Next, we reviewed the studies that focused on proxy measures of the coping capacity, such as savings, selling and ownership of productive assets under non-shock situations. Gehrke & Hartwig (2018) reviewed the evidence of program effects on savings and productive investments for eight PWPs: THIMO (Cote d'Ivoire), PSNP (Ethiopia), MGNREGA (India), MASAF (Malawi), KEP (Nepal), VUP (Rwanda), YESP (Sierra Leone), and CfW (Somalia). Note that some of these programs (PSNP, MGNREGA, MASAF KEP, VUP) had medium-term poverty reduction objectives or were providing employment guarantees, while others had short-term crisis relief objectives. In various PWPs, participants experienced increased savings, especially when they had access to PWPs for several years. Studies on the YESP in Sierra Leone (Rosas & Sabarwal, 2016) and the KEP in Nepal (Nepal National Planning Commission, 2012) indicated a higher participation in informal saving groups and ownership of assets (e.g., animals, land, agricultural tools or mobile phones). However, programs with limited duration, like the Somali CfW, showed an initial impact on productive investments, which however faded away fast (FAO, 2013). The VUP program in Rwanda generated positive effects on savings and livestock holdings in the short term: however, these effects, proved to persist only if beneficiaries participated in the program for a long time (Hartwig, 2014). The Ethiopian PSNP showed that asset accumulation, particularly in livestock, occurred only after four years of program participation (Andersson et al., 2011; Berhane et al., 2014). The exception to this pattern on null long-run effects is an ad-hoc PWP THIMO in Cote d'Ivoire, which increased stocks of savings and productive investments in the treatment group after only four months in the program.

Another recent review of 11 experimental evaluations of PWPs from low- and lower-middle-income countries (Comoros, Côte d'Ivoire, Laos, Djibouti, Sierra Leone, Egypt, Tunisia, Democratic Republic of Congo (DRC), and urban Ethiopia) by Bagga et al. (2023) found mixed evidence for the effect of the PWPs on savings. Specifically, in five out of eleven PWPs (Cote d'Ivoire, Djibouti, Egypt Community, Tunisia, Rural DRC), the causal effect of program participation on savings was positive and statistically significant, while in another 6 programs it was not statistically different from zero. The effects on households' assets were analyzed for only 7 programs: three of them found an increase in household assets index (Tunisia (2) and Rural DRC).

Hence, the vast majority of the empirical studies indicated that participation in PWPs increased households' coping capacity through higher savings and the holding of productive assets. However, such effects were predominantly detected in long-term PWPs.

As pointed out in Section 2, PWPs are likely to increase the adaptive capacity of households through the adoption of modern technologies, knowledge and practices related to climate-smart agriculture, diversification of income-generating activities, and diversification of livelihoods in general. Therefore, we next review the evidence of the effects of PWP on these outcomes under non-shock situations.

Tiwari et al. (2011) and Esteves et al. (2013) studied such effects for the Indian MGNREGA and showed that the program's introduction was indeed linked to decreased variability in crop yields, enhanced soil fertility, improved crop productivity, reduced soil erosion, and consequently, an overall increase in crop yields along with a decline in the agricultural vulnerability index, indicating that participation in the MGNREGA affected agricultural investments. Gehrke (2013) also showed that participation in the MGNREGA increased the use of risky but profitable crops. Zimmermann (2020) employed a regression-discontinuity design to examine the effects of the MGNREGA on livelihood diversification and found that participation in the MGNREGA increased the opening of small businesses, which could be associated with the insurance function of the MGNREGA. Similarly, the evidence from an ad-hoc PWP in Sierra Leone indicated that PWP participants were significantly more likely to set up new household enterprises than non-participants (Rosas & Sabarwal, 2016).

While the results for the MGNREGA in general indicate a positive impact on adaptive capacity, the evidence from other PWPs is less promising. Weldegebriel & Prowse (2013) studied the effect of the Ethiopian PSNP on livelihood diversification and risk management using propensity score matching methodology. Specifically, they looked at farm versus non-farm income increase, as a measure of households' diversification of activities. They showed that there was no significant effect of the PSNP on livelihood diversification (farm, nor non-farm income), while it notably increased natural-resource extraction, suggesting that the PSNP encouraged a negative adaptation strategy. Hoddinott et al. (2012) studied the effects of the PSNP on the use of fertilizer and investment in water retention, using matching techniques. Their results suggested that participation in the PSNP alone did not increase the use of fertilizer or agricultural investment. On the other hand, the effect of the PSNP was positive when combined with other food-security programs designed to increase agricultural productivity, potentially because combining several programs allows households to make complementary investments.

Beegle, Galasso, & Goldberg (2017) evaluated the effect of Malawi's MASAF on various outcomes including the use of fertilizer, relying on across- and within-village randomization. They found that, overall, there is no evidence that the PWP increased the use of fertilizer but they found a significant and positive effect in the Northern region on both beneficiaries and non-beneficiaries living in PWP villages. The authors suggested that this effect could be explained by limited employment duration in the MASAF in comparison to, for example, the Indian MGNREGA. On the other hand, a non-experimental study of Scognamillo & Sitko (2021) showed that Malawi's MASAF was associated with the adoption of CSA practices, such as building soil water conservation structures and applying the use of fertilizer.

In sum, long-duration employment guarantee programs such as the MGNREGA have the potential to improve the adaptive capacity of households by encouraging higher-risk, higher-return investments, business openings, and use of CSA practices. On the other hand, the evidence for less generous or ad-hoc programs and even a long duration programs including formal targeting mechanisms like PSNP is mixed.

4.2. The infrastructure component of PWPs

PWPs provide public goods, distinguishing them from cash transfers: these public goods can benefit entire communities and enhance resilience to weather shocks. Therefore, in this section, we discuss the evidence about the effects of PWPs on climate resilience for both program participants and the other community members through its other core component: the creation or rebuilding of public infrastructures. While recent PWP evaluations increasingly consider the impact of infrastructures created through PWPs, they have primarily concentrated on agricultural productivity and transaction cost assessments (Gehrke & Hartwig, 2018), with limited focus on communities' resilience to weather shocks. Moreover, most evidence is not experimental, but based on surveys on the beneficiaries (e.g., Fischer, 2020; Steinbach et al., 2020).

Several surveys have been conducted to understand the potential effects of infrastructure created by PWPs (mainly the Indian MGNREGA) on the communities with a particular focus on vulnerability to climate shocks. The India Institute of Science (2013) surveyed 2,057 households across four states where respondents were asked whether the MGNREGA projects contributed to reducing vulnerability to climate shock. The results of the survey suggested that MGNREGA assets reduced climate vulnerability by improving groundwater levels, expanding irrigated areas, enhancing drinking water availability, improving soil quality, reducing erosion, and increasing cultivated land and yields. The study constructed vulnerability indices, indicating a widespread decline in vulnerability due to MGNREGA assets, particularly those related to natural resources. Consistently, Fischer's (2020) survey of households in 35 villages within the Kangra District of Himachal Pradesh revealed that projects initiated under the MGNREGA played a pivotal role in alleviating various climate-related challenges. Importantly, the benefits of these projects were found to disproportionately benefit the poorer and more marginalized segments of society. While most of the projects prioritized rural connectivity, such as the construction of small roads, many of those initiatives were specifically geared towards improving access to remote areas during the monsoon season. This focus becomes crucial as the wet and muddy paths often become challenging to traverse, and mountain streams swell with water, making crossings difficult. Moreover, a substantial number of projects were directly dedicated to water management, involving the upgrading of water canals and tanks designed for capturing and storing rainwater.

Steinbach et al. (2020) conducted a comprehensive survey among MGNREGA workers in four districts affected by drought to understand how the program helped households to prepare, cope and recover from the shocks. The findings revealed that assets played a more significant role in enhancing climate resilience compared to wages. Specifically, most respondents reported that drought relief wages were delayed by, on average, six months. As a result, wages helped to prepare for future drought episodes but not to cope with, or recover from, the shock. Instead, about 30% of respondents reported that the community assets helped them to prepare, cope and recover from the drought. Notably, 52% of respondents stated that the MGNREGA positively influenced water conservation in their community. Consistently, Esteves et al. (2013) concluded that MGNREGA initiatives concentrating on the restoration of traditional water bodies, desilting, and the construction of new surface water harvesting structures had resulted in heightened water availability. This, in turn, had led to an expansion of the area dedicated to irrigated crop production and a decrease in the variability of crop yield.

This evidence directly indicates that the infrastructure component of the MGNREGA positively affects capacities to cope and to adapt to climate shocks; however this evidence is rather descriptive. A quasi-experimental study of Gehrke (2015) applied the DiD approach to the Indian MGNREGA to study the effects of MGNREGA infrastructure on agricultural productivity and the employment of non-participants. Specifically, the study compared farmers who had any MGNREGA activity carried out close to their lands to the farmers who did not.

The results indicated that there was a positive effect of the MGNREGA activity on agricultural production but no effect on the demand for labor. The study also indicated significant heterogeneity, with different types of infrastructure favoring specific groups. Landowners, for instance, benefited from land development-related infrastructure, while flood control infrastructure benefited the rural landless population, increasing their employment opportunities. This indicated that the infrastructural component of the MGNREGA may help households to adopt to future shocks.

Several studies have documented the effect of infrastructure in other countries. An experimental study by Christian et al. (2015) analyzed the effect of infrastructure created by the Labor Intensive Work Program (LIWP) in Yemen, a PWP that provides short-term employment to poor rural households in the construction of local infrastructure. Specifically, the projects provide medium to long-term benefits for the communities in adapting to water scarcity. The LIWP construction projects included reclamation of agricultural lands from harmful plants, protection of irrigation canals and water sources, improvement of rural roads, paving of rural markets, rainwater harvesting, construction of shallow wells, and terrace repair. The evaluation was based on the random assignment of 60 out of 120 communities into participation in the LIWP in the first year (2010), while the remaining 60 control communities entered the program in the second year (2011). Thus, the evaluation allowed one to study the short-term effects of infrastructure created by the LIWP on the capacity to adapt to climate shocks. To analyze the effects of infrastructure, the study estimated the treatment effect of the LIWP on water accessibility and transportation costs. The results suggested that the LIWP-created infrastructure reduced the average length of water-fetching trips during the rainy season, leading to an increase in water availability. Moreover, the increased access to water resulted in 1-2 fewer months of water shortage per year. Furthermore, most households (about

80%) reported that they benefited directly from the projects. This again indicates that PWP infrastructure is climate-smart and increases the capacity to cope and adapt to climate shocks.

In contrast, Kardan et al. (2017) discussed the effects of the PASP in Mozambique and concluded that the PASP was not likely to have an impact on climate resilience because of poor quality and durability of created assets, attributed to insufficient processes in infrastructure selection, design, and monitoring. Additionally, there was a limited supply of capital inputs, materials, and equipment, with selected infrastructure not aligning with local authorities' priorities, undermining ownership.

Furthermore, the degree of community involvement in project management and implementation plays an important role. Shigute (2022) specifically focused on the effect of the infrastructure component within the Ethiopian PSNP to study how community-level participation in the PSNP affected infrastructure projects quality and maintenance. The crucial elements of the projects conducted within the PSNP involved managing natural resources through soil conservation, flood control structures, and initiatives for water harvesting and conservation. In order to achieve its objectives and increase efficiency, the program had embraced an approach that required the active involvement of the community throughout the entire project cycle. To improve the targeting of beneficiaries, align projects with local preferences, and enhance service delivery while reducing corruption, the approach of decentralizing control over resources to local governments, along with community participation, was suggested Narayan (1995). Shigute (2022) demonstrated that community participation in planning and implementation decisions was high, and was evidently linked to a decrease in project damage. However, a significant portion of the infrastructure was reported as damaged, with an average project damage rate of 50% in districts with low community participation.

As outlined in Section 2, projects created by PWPs have the potential to enhance climate resilience and even mitigate climate change by fostering transformative actions. For instance, planting trees, which mitigate pollution, can not only bolster climate resilience but also decrease the probability of extreme weather events occurring. To study such effects, Hirvonen et al. (2022) looked at how the Ethiopian PSNP affected tree cover. Using a DiD approach and satellite data, they found that the PSNP increased tree cover by about 4% from 2005 to 2019, with a greater effect in less densely populated areas. Finally, although we cannot directly connect this discovery to infrastructure or the climate-smart component of Ethiopian the PSNP, Woolf et al. (2015) demonstrated that the Ethiopian PSNP yielded an average carbon benefit of 5.7 tonnes of CO_2e per hectare per year. This was primarily attributed to increased biomass (40%), higher soil organic carbon (38%), and reduced livestock emissions (22%). As a result, PWPs may not only enhance resilience but also contribute to climate change mitigation, thus highlighting the possible "transformative" role of social protection schemes (Devereux & Sabates-Wheeler, 2004).

Finally, some studies did not disentangle the effect of the wage component of PWPs from that of the infrastructure component but focused on the spillover effects of PWPs on non-participants, arguing that these spillover effects likely arose because of public infrastructure that had been created. Within the Ethiopian PSNP framework, the quasi-experimental study by Scognamillo et al. (2024) found that the positive impacts of the program on food security during weather shocks extended partially to the broader community beyond the direct participants. This spillover effect was likely attributed to the nature of the public works executed through the program, particularly the integrated community-based watershed development initiatives. The World Bank (2018) conducted a randomized control trial (RCT) within Egypt's PWP—The Emergency Labor Intensive Investment Project (ELIIP)—which aims to build and protect community assets in poor communities. ELIIP's infrastructure component includes several sectors including some climate-smart activities, such as Nile bank protection, canals cleaning and upgrading, as well as roads upgrading. The evaluation is based on randomization of villages into program participation to study the direct effect on participants as well as the spillover effects on non-participants in treated villages. The study found no statistically significant infrastructure effects for likelihood to suffer shocks.

Overall, there is some initial evidence that the infrastructure created by PWPs contributes to climate resilience, but the empirical literature is still too limited, especially that which relies on sound quantitative methods to derive firm conclusions.

4.3. The skill development component of PWPs

The third component of PWPs is skill-development. If PWPs include training on CSA practices or other forms of on-the-job training, they may enhance adaptation to climate shocks via the acquired skills.

Gehrke & Hartwig (2018) summarized the results from several PWP programs that contain the skill-development component, such as THIMO (Cote d'Ivoire), PSNP (Ethiopia), CfWTEP/YEP (Liberia), and LIWP (Yemen). Specifically, the THIMO incorporated compulsory training courses on entrepreneurship, the YEP included training of technical skills, internships, and employment search support, and the PSNP and the LIWP included on-the-job training. Kenya's Kazi KwaVijana Programme (KKV) also incorporated training and labor market activation, since its main goal was to improve youth employment outcomes. Another example of a program which may affect climate resilience through skill-development is the MASAF (Malawi), since it increases the use of climate-smart agriculture (CSA) practices promoted in the country. However, the evidence on the skill component of PWPs is very limited and mainly draws on non-experimental studies and observational data, with the exceptions of studies by Andersson et al. (2011) on the PSNP, and Bertrand et al. (2017) on the THIMO. Below we detail the results of these studies.

The totality of evidence indicates that participation in on-the-job training combined with wage and infrastructure can enhance individuals' knowledge levels in CSA practices and increase income and employment. One example is the Ethiopian PSNP where participants received training in soil and water conservation and afforestation. An experimental study by Andersson et al. (2011) suggested that participants acquiring forestry skills through the PSNP could explain its positive impact on tree holdings. However, the study did not disentangle this skill component from the rest of components of the PWP. Consistently, a survey of evidence for the PSNP by Lieuw-Kie-Song (2011) suggested that almost half of those involved in the PSNP gained soil and water conservation skills that they subsequently applied to their personal land. In Yemen, the focus group study suggested that participants of the LIWP gained skills in construction-oriented tasks like stone-cutting and masonry, potentially opening avenues for future employment (Lieuw-Kie-Song, 2014), which may help them to adopt for future weather shocks.

Other PWPs may boost skill development because of training components. The THIMO in Cote d'Ivoire offered credible evidence, having been evaluated through an RCT (Bertrand et al., 2017). This program combined public works with complementary training on basic entrepreneurship or job-search skills. Specifically, to evaluate the training component of the PWP, a random subset of beneficiaries was offered basic business training to facilitate transition into self-employment or training in job-search skills to facilitate access to the job market, which may induce the generation of income-generating activities and, as a result, enhance the adaptive capacity. While the study found no impact on the level of employment, it found a significant positive impact on earnings, driven by non-agricultural and self-employment activities in the group assigned to complementary business training.

Finally, PWPs may improve climate resilience through skill development when the latter is combined with the promotion of CSA practices, as in Malawi (Beierl, 2021; Scognamillo & Sitko, 2021). Beierl (2021) applied the DiD approach to study the skill and other components of Malawi's MASAF, using the number of CSA practices (soil and water conservation) and days worked on these CSA practices as indicators of skills vector. The results of this study indicate an increase in CSA practices in MASAF catchments comparing to the control catchments with the effect being driven by non-participants. Scognamillo and Sitko (2021) demonstrated that involvement in the MASAF was correlated with an increased adoption of CSA methods, fostering sustained utilization over multiple agricultural seasons. Second, it showed that the combined impact of participating in the MASAF and maintaining the use of soil water conservation structures significantly enhanced households' productivity and welfare. Scognamillo & Sitko (2021) suggested that this effect is probably due to the transfer of skills acquired during MASAF public works to farmers' personal fields.

In summary, although much more work needs to be done in this area, the limited evidence available suggests that the skills development of PWPs in combination with infrastructure components can improve climate resilience.

5. Conclusions

With the ongoing speed of climate change, it is necessary to identify policies that support households' resilience to climate-related shocks. This paper has focused on the role of PWPs from both a theoretical or from an empirical perspective. Specifically, in this paper, we developed a diagrammatic conceptual framework to understand how, and to what extent, PWPs foster climate resilience, and conducted a comprehensive review of the empirical evidence on the effects of PWPs on climate resilience, linking it to our conceptual framework. While several previous studies have reviewed the evidence of the effects of PWPs (Gehrke & Hartwig, 2018;

Beierl, 2021; Bagga et al., 2023), these studies do not focus directly on climate resilience. Similarly, previous studies have created conceptual frameworks that explain the link between social protection programs and climate resilience, but this literature either had a more general focus on all social protection programs (Costella et al., 2023), on one particular program (e.g., Godfrey-Wood & Flower, 2018), or was not directly connected with recent empirical literature (Beazley et al., 2016). Hence, we attempt to fill this gap.

First, based on our conceptual framework, PWPs may affect the capacity to cope with the shock through the wage component by creating additional economic resources during the period of negative shocks; and by promoting savings and investments in productive assets. Additionally, the wage component of PWPs may affect the capacity to adapt to climate change by inducing households to use different technology (especially, climate-smart technology) and, in general, to diversify the livelihoods. Second, the infrastructure/service component of PWPs could affect climate resilience mainly by enhancing household long-term capacity to adapt to climate change. This is especially the case when PWPs are used to create "climate-smart" infrastructures, such as water conservation or provide services like afforestation, which may benefit the entire community. Thirdly, the PWPs are often combined with training of workers, which may induce skill-development and increase households' capacity to adapt to climate shocks, for example by inducing them to use CSA practices and to diversify the livelihood.

Our review of evidence suggests that the wage component of PWPs interacts significantly with weather shocks. Participants in PWPs are less likely to reduce their labor supply or experience food insecurity during negative weather events than non-participants. However, PWPs may also exacerbate the adverse effects of climate shocks on agricultural productivity. This could be due to a spillover effect, where PWPs decrease labor supply in agriculture and agricultural wages become less responsive to negative weather shocks. Moreover, the majority of empirical studies from different countries indicate that participation in PWPs enhances households' coping capacity through increased savings and the accumulation of productive assets. However, these benefits typically materialize when individuals participate in the program for several years and are thus predominantly observed in long-term PWPs, such as the Indian MGNREGA. Furthermore, the results of the review indicate that long-term employment guarantee programs such as the MGNREGA have the potential to enhance households' adaptive capacity by encouraging higher-risk investments and the adoption of CSA practices. In contrast, less generous or short-term emergency programs seem to have limited bearing on the adaptive capacity.

Regarding the infrastructure component, numerous descriptive studies suggest that community assets created through PWPs positively affect climate resilience. Projects focusing on rural connectivity, water management, and watershed development initiatives are reported to alleviate climate-related challenges and are often positively evaluated by the communities. A few quasi-experimental studies suggest positive spillover effects on non-participants within treatment communities, such as a reduction in the negative effects of weather shocks on food security, likely driven by community assets created by the PWPs. Moreover, some studies in Ethiopia suggest that PWPs may even have a climate change mitigation effect since their projects increase tree cover and decrease emissions.

Finally, the overall evidence on the skill-development component of PWPs suggests that combining on-the-job training with wage support and infrastructure development can enhance individuals' knowledge of CSA practices, while also increasing their income and employment opportunities, potentially promoting livelihood diversification. However, evidence on the skill component of PWPs is very limited and primarily based on non-experimental studies.

In general, the effects of different components of PWPs on climate resilience may largely depend on how the program is designed and implemented. Some studies highlight the relevance of factors such as payment delays, fund leakage, and deterioration of assets created by the

PWPs in explaining their effectiveness. While it is key that transfers are delivered on time to support households coping with shocks, several sources have documented delays in the disbursement of wages (Mugabo (2018) in Rwanda; Steinbach et al. (2020) in India; Hoddinott et al. (2011) in Ethiopia). Furthermore, the active participation of communities in the decision-making of the projects seems to increase the quality and maintenance of the assets created.

In brief, this paper has shown that PWPs can be used as an important policy tool to strengthen the resilience of beneficiaries and reduce poverty in the face of climate shocks, particularly if investments in high-quality and relevant infrastructures is made. However, more research is needed to provide evidence on which intervention components of PWPs and which design features matter the most for effective resilience-building. In particular, there is a lack of scientifically sound evidence on the impact of PWPs through their infrastructure/service component. In addition, future studies should explore the effectiveness of combining infrastructure projects with skills development and on-the-job training to enhance the resilience capacity of beneficiaries, and beyond. Finally, PWPs—more than other social protection schemes—can have relevant (positive) spillover effects on the entire communities where they are implemented, in particular through the infrastructure component. This is especially the case given the increasing emphasis on climate-smart infrastructures, which specifically have the objective of fostering resilience. Since there are only very few rigorous studies that investigate PWPs' impacts beyond those on their immediate beneficiaries, more research should be oriented towards a more comprehensive documentation of these spillover effects. Only with adequate information on the overall effects on different members of the society, and on the channels through which these effects materialize, can policymakers take decisions about when to implement PWPs (especially in comparison with other social protection interventions), and how to design them.

References

Adam, H. N. (2015). Mainstreaming adaptation in India–the Mahatma Gandhi National rural employment guarantee act and climate change. *Climate and Development*, *7*(2), 142–152.

Ajefu, J. B., & Abiona, O. (2019). Impact of shocks on labour and schooling outcomes and the role of public work programmes in rural India. *The Journal of Development Studies*, *55*(6), 1140–1157.

Amadu, F. O., McNamara, P. E., & Miller, D. C. (2020). Understanding the adoption of climate-smart agriculture: A farm-level typology with empirical evidence from southern Malawi. *World Development*, *126*, 104692.

Andersson, C., Mekonnen, A., & Stage, J. (2011). Impacts of the Productive Safety Net Program in Ethiopia on livestock and tree holdings of rural households. *Journal of Development Economics*, *94*(1).

Angelucci, M., & De Giorgi, G. (2009). Indirect Effects of an Aid Program: How Do Cash Transfers Affect Ineligibles' Consumption? *American Economic Review*, *99*(1), 486–508.

Asher, S., & Novosad, P. (2020). Rural Roads and Local Economic Development. *American Economic Review*, *110*(3), 797–823.

Bagga, A., Holmlund, M., Khan, N., Mani, S., Mvukiyehe, E., & Premand, P. (2023). *Do Public Works Programs Have Sustained Impacts? A Review of Experimental Studies from LMICs* (10471; Policy Research Working Paper). http://www.worldbank.org/prwp.

Bahadur, A. V., Peters, K., Wilkinson, E., Pichon, F., Gray, K., & Tanner, T. (2015). The 3As: tracking resilience across BRACED. Working and discussion papers.

Barrett, C. B., Ghezzi-Kopel, K., Hoddinott, J., Homami, N., Tennant, E., Upton, J., & Wu, T. (2021). A scoping review of the development resilience literature: Theory, methods and evidence. *World Development*, 146, 105612.

Beazley, R., McCord, A., Solórzano, A., & others. (2016). *Public works programmes for protection and climate resilience*.

Beegle, K., Galasso, E., & Goldberg, J. (2017). Direct and indirect effects of Malawi's public works program on food security. *Journal of Development Economics*, *128*, 1–23.

Beierl, S. (2021). *Public Works Programmes: Review of their effectiveness and empirical essays on their contribution to climate resilience and social cohesion*.

Béné, C., Devereux, S., & Sabates-Wheeler, R. (2012). Shocks and social protection in the Horn of Africa: analysis from the Productive Safety Net Programme in Ethiopia. *IDS Working Papers*, *2012*(395), 1–120.

Béné, C., Frankenberger, T., & Nelson, S. (2015). Design, monitoring and evaluation of resilience interventions: conceptual and empirical considerations. *Institute of Development Studies Working Paper*, *459*.

Béné, C., Wood, R. G., Newsham, A., & Davies, M. (2012). Resilience: new utopia or new tyranny? Reflection about the potentials and limits of the concept of resilience in relation to vulnerability reduction programmes. *IDS Working Papers*, *2012*(405), 1-61.

Berhane, G., Gilligan, D. O., Hoddinott, J., Kumar, N., & Taffesse, A. S. (2014). Can social protection work in Africa? The impact of Ethiopia's productive safety net programme. *Economic Development and Cultural Change*, *63*(1), 1–26.

Bertrand, M., Crépon, B., Marguerie, A., & Premand, P. (2017). *Contemporaneous and Post-Program Impacts of a Public Works Program: Evidence from Côte d'Ivoire*. World Bank.

Bowen, T., Del Ninno, C., Andrews, C., Coll-Black, S., Gentilini, U., Johnson, K., Kawasoe, Y., Kryeziu, A., Maher, B., & Williams, A. (2020). *Adaptive Social Protection Building Resilience to Shocks*. World Bank Group

Christian, S., de Janvry, A., Egel, D., & Sadoulet, E. (2015). *Quantitative evaluation of the social fund for development labor intensive works program (LIWP)*.

Costella, C., van Aalst, M., Georgiadou, Y., Slater, R., Reilly, R., McCord, A., Holmes, R., Ammoun, J., & Barca, V. (2023). Can social protection tackle emerging risks from climate change, and how? A framework and a critical review. *Climate Risk Management*, 100501.

Cunha, J. M., De Giorgi, G., & Jayachandran, S. (2018). The Price Effects of Cash versus In-Kind Transfers. *The Review of Economic Studies*, *10.1093/re*. https://doi.org/10.2139/ssrn.2640163

Daidone, S., & Fontes, F. P. (2023). The role of social protection in mitigating the effects of rainfall shocks. Evidence from Ethiopia. *Journal of Productivity Analysis*, *60*(3), 315–332.

Dasgupta, S., & Robinson, E. J. Z. (2021). Improving food policies for a climate insecure world: evidence from Ethiopia. *National Institute Economic Review*, *258*, 66–82.

Dercon, S., & Christiaensen, L. (2011). Consumption risk, technology adoption and poverty traps: Evidence from Ethiopia. *Journal of Development Economics*, *96*(2), 159–173. https://doi.org/10.1016/J.JDEVECO.2010.08.003

Devereux, S., & Guenther, B. (2007). Social protection and agriculture in Ethiopia. *Country Case Study Paper Prepared for a Review Commissioned by the FAO on Social Protection and Support to Small Farmer Development*.

Devereux, S., & Sabates-Wheeler, R. (2004). IDS Working Paper 232. Transformative social protection.

Esteves, T., Rao, K. V, Sinha, B., Roy, S. S., Rao, B., Jha, S., Singh, A. B., Vishal, P., Nitasha, S., Rao, S., & others. (2013). Agricultural and livelihood vulnerability reduction through the MGNREGA. *Economic and Political Weekly*, 94–103.

FAO. (2013). *Like a good trip to town without selling your animals: A study of FAO Somalia's cash for work program Impact Evaluation Report*.

Fischer, H. W. (2020). Policy innovations for pro-poor climate support: social protection, small-scale infrastructure, and active citizenship under India's MGNREGA. *Climate and Development*, *12*(8), 689–702.

Franklin, S., Imbert, C., Abebe, G., & Mejia-Mantilla, C. (2024). Urban Public Works in Spatial Equilibrium: Experimental Evidence from Ethiopia. *American Economic Review*.

Gazeaud, J., & Stephane, V. (2023). Productive Workfare? Evidence from Ethiopia's Productive Safety Net Program. *American Journal of Agricultural Economics*, *105*(1), 265–290.

Gazeaud, J., Mvukiyehe, E., & Sterck, O. (2019). Public works and welfare: a randomized control trial of the Comoros Social Safety Net Project: endline report.

Gehrke, E. (2013). Does the Indian Employment Guarantee reduce households' risk exposure? Assessing the effects of the NREGA on crop choice. Unpublished manuscript, IZA–Institute of Labor Economics.

Gehrke, E. (2015). *Can public works infrastructure affect employment outcomes? Evidence from the NREGS in India* (Issue 9/2015). Discussion Paper.

Gehrke, E., & Hartwig, R. (2018). Productive effects of public works programs: What do we know? What should we know? *World Development*, *107*, 111–124.

Godfrey-Wood, R., & Flower, B. C. R. (2018). Does guaranteed employment promote resilience to climate change? The case of India's Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). *Development Policy Review*, *36*, O586–O604.

Hadley, K., Wheat, S., Rogers, H. H., Balakumar, A., Gonzales-Pacheco, D., Davis, S. S., Linstadt, H., Cushing, T., Ziska, L. H., Piper, C., & Sorensen, C. (2023). Mechanisms underlying food insecurity in the aftermath of climate-related shocks: a systematic review. *The Lancet Planetary Health*, *7*(3), e242–e250. https://doi.org/10.1016/S2542-5196(23)00003-7

Hartwig, R. (2014). *The Vision 2020 Umurenge Program (VUP): Impact evaluation report (2009-2014)*.

Hidrobo, M., Hoddinott, J., Kumar, N., & Olivier, M. (2018). Social Protection, Food Security, and Asset Formation. *World Development*, *101*, 88–103.

Hirvonen, K., Machado, E. A., Simons, A. M., & Taraz, V. (2022). More than a safety net: Ethiopia's flagship public works program increases tree cover. *Global Environmental Change*, *75*, 102549. https://doi.org/10.1016/J.GLOENVCHA.2022.102549

Hoddinott, J., Berhane, G., Gilligan, D. O., Kumar, N., & Seyoum Taffesse, A. (2012). The impact of Ethiopia's Productive Safety Net Programme and related transfers on agricultural productivity. Journal of African Economies, 21(5), 761-786.

Hoddinott, J., Kumar, N., Taffesse, A. S., & Tefera, M. (2011). Evaluation of Ethiopia's Food Security Program: Documenting progress in the implementation of the Productive Safety Nets Programme and the Household Asset Building Programme'. *Unpublished Report, International Food Policy Research Institute and Ethiopian Development Research Institute*.

ILO. (2018). *World Employment and Social Outlook 2018 – Greening with jobs*. www.ilo.org/publns.

Imbert, C., & Papp, J. (2015). Labor Market Effects of Social Programs: Evidence from India's Employment Guarantee. *American Economic Journal: Applied Economics*, *7*(2), 233–263. https://doi.org/10.1257/APP.20130401

India Institute of Science. (2013). *Environmental benefits and vulnerability reduction through Mahatma Gandhi National Rural Employment Guarantee Scheme*. India Institute of Science.

IPCC. (2018). *Global Warming of 1.5 C*. http://www.ipcc.ch/report/sr15/

Kardan, A., Bailey, S., Solorzano, A., & Fidalgo, L. (2017). *Shock-Responsive Social Protection Systems Research Case study—Mozambique*.

Knippenberg, E., & Hoddinott, J. (2019). Shocks, social protection, and resilience: Evidence from Ethiopia. *Gates Open Res*, *3*(702), 702.

Lambeau, J. L., & Urban, S. (Eds.). (2021). *Social protection and climate change: The role of social insurance* . ILO. https://socialprotection.org/discover/publications/social-protection-and-climate-change-role-social-insurance

Lieuw-Kie-Song, M. (2011). Integrating public works and cash transfers in Ethiopia.

Lieuw-Kie-Song, M. (2014). Study on the labour-intensive work programme in Yemen. Geneva: ILO.

Loewe, M., & Zintl, T. (2023). Are cash-for-work programmes good for local economic growth? The case of donor-funded public works for refugees and nationals in Jordan. *Canadian Journal of Development Studies / Revue Canadienne d'études Du Développement*.

McCord, A., R. Beazley, A. Solórzano, and L. Artur. 2016. Social Protection and Climate Change in Mozambique, with a focus on the role of PASP: feasibility and design. Oxford: Oxford Policy Management.

Mugabo, J. (2018). *Assessment of the Limitations of Vision 2020 Umurenge Program (VUP) to uplift Socio-Economic Status of the Poor People in Kayonza District*. University of Rwanda.

Muralidharan, K., Niehaus, P., & Sukhtankar, S. (2018). *General equilibrium effects of (improving) public employment programs: experimental evidence from India* (23838; NBER Working Paper). http://www.nber.org/papers/w23838

Narayan Parker, D. (1995). The contribution of people's participation: evidence from 121 rural water supply projects. In *The contribution of people's participation: evidence from 121 rural water supply projects* (p. 108).

Nepal National Planning Commission. (2012). *Assessment of Karnali Employment Program*.

Rosas, N., & Sabarwal, S. (2016). Can you work it? Evidence on the productive potential of public works from a youth employment program in Sierra Leone. *Evidence on the Productive*

Potential of Public Works from a Youth Employment Program in Sierra Leone (February 25, 2016). World Bank Policy Research Working Paper, *7580*.

Rosenzweig, M. R., & Udry, C. (2014). Rainfall forecasts, weather, and wages over the agricultural production cycle. *American Economic Review*, *104*(5), 278–283.

Sakketa, T., & von Braun, J. (2019). Labor-intensive public works programs in sub-Saharan Africa: Experiences and implications for employment policies.

Scognamillo, A., & Sitko, N. J. (2021). Leveraging social protection to advance climate-smart agriculture: An empirical analysis of the impacts of Malawi's Social Action Fund (MASAF) on farmers' adoption decisions and welfare outcomes. *World Development*, *146*, 105618.

Scognamillo, A., Mastrorillo, M., & Ignaciuk, A. (2024). One for all and all for one: Increasing the adaptive capacity of households and communities through a public work programme. *World Development*, *175*, 106467.

Sengupta, S., & Costella, C. (2023). A framework to assess the role of social cash transfers in building adaptive capacity for climate resilience. *Journal of Integrative Environmental Sciences*, *20*(1), 2218472.

Shigute, Z. (2022). Community participation and the quality of rural infrastructure in Ethiopia. *Journal of African Economies*, *31*(4), 355–383.

Solórzano, A. and Cárdenes, I. (2019). Social protection and climate change: WFP Regional Bureau for Latin America and the Caribbean's vision to advance climate change adaptation through social protection. World Food Programme in collaboration with Oxford Policy Management.

Steinbach, D., Soanes, M., Barrett, S., Venkataramani, V., & Cheranda, T. M. (2020). Deepening knowledge of MGNREGS' contribution to climate resilience: a study of Rajasthan and Uttar Pradesh. *IIED, London*.

Subbarao, K., Del Ninno, C., Andrews, C., & Rodriguez-Alas, C. (2012). *Public works as a safety net: design, evidence, and implementation*. World Bank Publications.

Subbarao, K., Del Ninno, C., Andrews, C., & Rodríguez-Alas, C. (Eds.). (2013). *Public Works as a Safety Net. Design, Evidence, and Implementation*. The World Bank.

Taraz, V. (2023). Public works programmes and agricultural risk: Evidence from India. *Australian Journal of Agricultural and Resource Economics*.

Tiwari, A. (2022). *Do Workfare programs affect Agricultural Risk through Crop Choice? Evidence from India*.

Tiwari, R., Somashekhar, H. I., Parama, V. R. R., Murthy, I. K., Kumar, M. S. M., Kumar, B. K. M., Parate, H., Varma, M., Malaviya, S., Rao, A. S., & others. (2011). MGNREGA for environmental service enhancement and vulnerability reduction: rapid appraisal in Chitradurga district, Karnataka. *Economic and Political Weekly*, 39–47.

Weldegebriel, Z. B., & Prowse, M. (2013). Climate-change adaptation in Ethiopia: to what extent does social protection influence livelihood diversification? *Development Policy Review*, *31*, o35–o56.

Woolf, D., Jirka, S., Milne, E., Easter, M., DeGloria, S., Solomon, D., & Lehmann, J. (2015). *Climate Change Mitigation Potential of Ethiopia's Productive Safety-Net Program (PSNP)*.

World Bank. (2018). *Public Works and Welfare: A Randomized Control Trial of a Labor Intensive Public Works Program focusing on Community Infrastructure in a Lower Middle Income Country*.

Zimmermann, L. (2020). *Why Guarantee Employment? Evidence from a Large Indian Public-Works Program Declarations of Interest: None. I thank* (Global Labor Organization). http://hdl.handle.net/10419/215480

2020

2020/01, Daniele, G.; Piolatto, A.; Sas, W.: "Does the winner take it all? Redistributive policies and political extremism"
2020/02, Sanz, C.; Solé-Ollé, A.; Sorribas-Navarro, P.: "Betrayed by the elites: how corruption amplifies the political effects of recessions"
2020/03, Farré, L.; Jofre-Monseny; J., Torrecillas, J.: "Commuting time and the gender gap in labor market participation"
2020/04, Romarri, A.: "Does the internet change attitudes towards immigrants? Evidence from Spain"
2020/05, Magontier, P.: "Does media coverage affect governments'preparation for natural disasters?"
2020/06, McDougal, T.L.; Montolio, D.; Brauer, J.: "Modeling the U.S. firearms market: the effects of civilian stocks, crime, legislation, and armed conflict"
2020/07, Veneri, P.; Comandon, A.; Garcia-López, M.A.; Daams, M.N.: "What do divided cities have in common? An international comparison of income segregation"
2020/08, Piolatto, A.: "'Information doesn't want to be free': informational shocks with anonymous online platforms"
2020/09, Marie, O.; Vall Castello, J.: "If sick-leave becomes more costly, will I go back to work? Could it be too soon?"
2020/10, Montolio, D.; Oliveira, C.: "Law incentives for juvenile recruiting by drug trafficking gangs: empirical evidence from Rio de Janeiro"
2020/11, Garcia-López, M.A.; Pasidis, I.; Viladecans-Marsal, E.: "Congestion in highways when tolls and railroads matter: evidence from European cities"
2020/12, Ferraresi, M.; Mazzanti, M.; Mazzarano, M.; Rizzo, L.; Secomandi, R.: "Political cycles and yardstick competition in the recycling of waste. evidence from Italian provinces"
2020/13, Beigelman, M.; Vall Castelló, J.: "COVID-19 and help-seeking behavior for intimate partner violence victims"
2020/14, Martínez-Mazza, R.: "Mom, Dad: I'm staying" initial labor market conditions, housing markets, and welfare"
2020/15, Agrawal, D.; Foremny, D.; Martínez-Toledano, C.: "*Paraísos fiscales*, wealth taxation, and mobility"
2020/16, Garcia-Pérez, J.I.; Serrano-Alarcón, M.; Vall Castelló, J.: "Long-term unemployment subsidies and middle-age disadvantaged workers' health"

2021

2021/01, Rusteholz, G.; Mediavilla, M.; Pires, L.: "Impact of bullying on academic performance. A case study for the community of Madrid"
2021/02, Amuedo-Dorantes, C.; Rivera-Garrido, N.; Vall Castelló, J.: "Reforming the provision of cross-border medical care evidence from Spain"
2021/03, Domínguez, M.: "Sweeping up gangs: The effects of tough-on-crime policies from a network approach"
2021/04, Arenas, A.; Calsamiglia, C.; Loviglio, A.: "What is at stake without high-stakes exams? Students' evaluation and admission to college at the time of COVID-19"
2021/05, Armijos Bravo, G.; Vall Castelló, J.: "Terrorist attacks, Islamophobia and newborns'health"
2021/06, Asensio, J.; Matas, A.: "The impact of 'competition for the market'regulatory designs on intercity bus prices"
2021/07, Boffa, F.; Cavalcanti, F.; Piolatto, A.: "Ignorance is bliss: voter education and alignment in distributive politics"

2022

2022/01, Montolio, D.; Piolatto, A.; Salvadori, L.: "Financing public education when altruistic agents have retirement concerns"
2022/02, Jofre-Monseny, J.; Martínez-Mazza, R.; Segú, M.: "Effectiveness and supply effects of high-coverage rent control policies"
2022/03, Arenas, A.; Gortazar, L.: "Learning loss one year after school closures: evidence from the Basque Country"
2022/04, Tassinari, F.: "Low emission zones and traffic congestion: evidence from Madrid Central"
2022/05, Cervini-Plá, M.; Tomàs, M.; Vázquez-Grenno, J.: "Public transportation, fare policies and tax salience"
2022/06, Fernández-Baldor Laporta, P.: "The short-term impact of the minimum wage on employment: Evidence from Spain"

2022/07, Foremny, D.; Sorribas-Navarro, P.; Vall Castelló, J.: "Income insecurity and mental health in pandemic times"
2022/08, Garcia-López, M.A.; Viladecans-Marsal, E.: "The role of historic amenities in shaping cities"
2022/09, Cheshire, P. C., Hilber, C. A. L., Montebruno, P., Sanchis-Guarner, R.: "(IN)convenient stores? What do policies pushing stores to town centres actually do?"
2022/10, Sanchis-Guarner, R.: "Decomposing the impact of immigration on house prices"

2023

2023/01, Garrouste, M., Lafourcade, M.: "Place-based policies: Opportunity for deprived schools or zone-and-shame effect?"
2023/02, Durán-Cabré, J.M., Esteller-Moré A., Rizzo L., Secomandi, R.: "Fiscal Knowledge and its Impact on Revealed MWTP in COVID times: Evidence from Survey Data"
2023/03, Esteller-Moré A., Galmarini U.: "Optimal tax administration responses to fake mobility and underreporting"
2023/04, Armijos Bravo, G., Vall Castelló, J.: "Job competition in civil servant public examinations and sick leave behavior"
2023/05, Buitrago-Mora, D., Garcia-López, M.A.: "Real estate prices and land use regulations: Evidence from the law of heights in Bogotá"
2023/06, Rodriguez-Planas, N., Secor, A.: "College Students' Social Capital and their Perceptions of Local and National Cohesion"
2023/07, Obaco, M., Davi-Arderius D., Pontarollo, N.: "Spillover Effects and Regional Determinants in the Ecuadorian Clean-Cooking Program: A Spatiotemporal Econometric Analysis"
2023/08, Durán-Cabré, J.M., Esteller-Moré, A., Rizzo, L., Secomandi, R.: "Has Covid Vaccination Success Increased our Marginal Willingness to Pay Taxes?"
2023/09, Borrella-Mas, M.A., Millán-Quijano, J., Terskaya, A.: "How do Labels and Vouchers Shape Unconditional Cash Transfers? Experimental Evidence from Georgia"
2023/10, Messina, J., Sanz-de-Galdeano, A., Terskaya, A.: "Birds of a Feather Earn Together. Gender and Peer Effects at the Workplace"
2023/12, Rodríguez-Planas, N., Secor, A., De Balanzó Joue, R.: "Resilience-thinking Training for College Students: Evidence from a Randomized Trial"
2023/13, Arenas, A., Calsamiglia, C.: "Gender differences in high-stakes performance and college admission policies"

2024

2024/01, Wald, G., Cohen, F., Kahn, V.: "Making Jobs out of the Energy Transition: Evidence from the French Energy Efficiency Obligations Scheme"
2024/02, Durán-Cabré, J. M., Esteller-Moré, A., Montolio, D., Vázquez-Grenno, J.: "Can Teachers Influence Student Perceptions and Preferences? Experimental Evidence from a Taxation Course"
2024/03, Brutti, Z., Montolio, D.: "Muddying the Waters: How Grade Distributions Change when University Exams Go Online"
2024/04, Durán-Cabré, J. M., Esteller-Moré, A., Salvadori, L.: "Discovering Tax Decentralization: Does it Impact Marginal Willingness to Pay Taxes?"
2024/05, Muñoz-Sobrado, E., Piolatto, A., Zerbini, A., Braccioli, F.: "The Taxing Challenges of the State: Unveiling the Role of Fiscal & Administrative Capacity in Development"
2024/06, Bellés-Obrero, C., Rice, C. T., Zerbini, A., Vall Castelló, J.: "It where it hurts: Healthcare access and intimate partner violence"
2024/07, Bellés-Obrero, C., Jiménez-Martín, S., Ye, H.: "The Effect of Removing Early Retirement on Mortality"
2024/08, Magre-Pont, J., Magontier, P., Solé-Ollé, A.: "Political Parties and Public Policies. A review of the Spanish evidence"
2024/09, Bergvall, S., Rodríguez-Planas, N.: "Motherhood and Domestic Violence: A Longitudinal Study Using Population-Wide Administrative Data"
2024/10, Magontier, P., Solé-Ollé, A., Viladecans-Marsal, E.: "The Political Economy of Coastal Development"
2024/11, Sanchis-Guarner, R., Szumilo, N., Vernet, A.: "Startup stations: the impact of rail access on entrepreneurship (self-employment) in England and Wales"

Institut d'Economia de Barcelona

ieb@ub.edu
www.ieb.edu

Public Policies

IEB Working Paper