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Productive effects of public works programs: What do we know? What should we know?

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ABSTRACT

Public Works (PW) programs are popular development interventions due to their potential 'double dividend' of transferring income to the poor while at the same time creating public infrastructure. However, PW programs are costly and demanding from an administrative perspective and it is not clear whether they are the most cost-effective intervention to reduce poverty. Therefore, an assessment of PW programs needs to understand which benefits and costs these programs entail relative to other interventions, and whether or not the extra cost can be outweighed by generating benefits over and above those of alternative interventions, such as Cash Transfer programs.

This paper seeks to identify these benefits, and develops a conceptual framework that highlights four mechanisms through which PW programs could strengthen the productive capacity of poor households beyond the effects of Cash Transfers: productive investments, labor market effects, skills development, and increases in trade and production. It then reviews available empirical evidence from PW programs in developing countries. The results suggest that PW programs can induce productive investments via income and insurance effects when the program is sufficiently reliable and long-term. PW programs can also have positive welfare effects by raising wages, but potential adverse effects on labor markets have to be taken into account. Implicit or explicit training components of PW programs do not seem to increase the employability or business earnings of participants. Finally, there is only scant empirical evidence on the productive effects of the public infrastructure generated by PW programs, and further research is crucial to understand and quantify those effects. This paper concludes that PW programs are only preferable over alternative interventions if they generate substantial investments among the target group, if there is clear evidence that private-sector wages are below equilibrium wages, or if the public infrastructure generated in PW programs has substantial growth effects.

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1. Introduction

Public Works (PW) programs experienced a revival throughout the developing world in the past years. Prominent examples include the Programa de Jefes y Jefas de Hogar in Argentina (henceforth referred to as 'Jefes y Jefas'), the Productive Safety Net Program (PSNP) in Ethiopia, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in India, the Vision 2020 Umurenge Program (VUP) in Rwanda and the Expanded Public Works Program (EPWP) in South Africa.

The Syrian refugee crisis and other employment crises such as the high youth unemployment in the Middle East and North Africa (MENA) have also renewed the interest in PW programs, because these programs are able to generate large-scale employment opportunities within a relatively short period of time. The numbers alone are impressive: 80 million participants in the MGNREGA in India, 10 million in the Program Nasional Pemberdayaan Mandiri (PNPM) in Indonesia, seven million in the PSNP in Ethiopia and two million in the Jefes y Jefas in Argentina.

PW programs are public interventions that provide employment to poor households and individuals at relatively low wages. Their labor is typically used for labor-intensive infrastructure projects, which are designed to increase the availability of public goods in the targeted regions (Del Ninno et al., 2009). Most PW programs follow twin goals: First, they seek to reduce poverty by transferring income to the poor. Second, they use the work force of program participants to carry out labor-intensive infrastructure projects or to generate other types of public goods to enhance development in the targeted regions (Alderman & Yemtsov, 2014; Subbarao, del Ninno, Andrews, & Rodríguez-Alas, 2013).

Traditionally, PW programs have been used as crisis relief: They were adopted in response to economic downturns or natural disasters and scaled-down or discontinued when labor market or overall economic conditions improved (Lieuw-Kie-Song, Philip, Tsukamoto, & van Imschoot, 2011). Prominent examples are the Maharashtra Employment Guarantee Scheme in India which was scaled up dramatically in the face of drought or the Jefes y Jefas with which Argentina responded to the economic crisis in 2001 (Dev, 2006; Galasso & Ravallion, 2004). Lately, many innovative elements have been introduced into PW programs with the aim of attaining additional goals. Examples are the combination of PW programs with training components to improve the quality of the labor supply or to make these programs more permanent in order to achieve social protection goals. What remains common to all PW programs is that they seek to reduce poverty by providing employment opportunities to the poor.

While PW programs have proven successful in alleviating the negative effects of food price hikes, economic downturns and other crises (Bertrand, Cépron, Maguerie, & Premand, 2017; Galasso & Ravallion, 2004; Ravallion, 1999), they are demanding from an administrative perspective and comparatively expensive to run. Because public infrastructure projects need to be planned, implemented and managed, overheads are on average substantially higher than in basic Cash Transfer (CT) programs. For each dollar spent, an average of 42 cents reaches beneficiaries in CT Programs, *vis-à-vis* 31 cents in PW programs (ASPIRE, 2017).[1] There is also some evidence that participants' welfare losses from forgone income are considerably higher in PW programs than in other poverty reduction programs (Murgai, Ravallion, & van de Walle, 2016). On the other hand, PW programs can generate benefits that could not be obtained with alternative interventions (most importantly through the creation of public goods).

This paper seeks to analyze the merits of PW programs against alternative interventions. We argue that there is always an opportunity cost of spending public money on a PW program, since the money could alternatively be transferred directly to the poor (for example through a Cash Transfer scheme).[2] Therefore, an assessment of PW programs needs to understand which benefits and costs these programs entail relative to other interventions, and whether or not the extra cost (public and private) can be outweighed by generating benefits over and above those of such alternative interventions.

In order to assess the merits of PW programs against CT programs more systematically, we develop a conceptual framework that highlights four mechanisms through which PW programs could generate benefits for the poor that go beyond those of CT programs. All four of these mechanisms strengthen the productive capacity of the poor, and could therefore contribute to poverty reduction and economic development in the long-run.

In contrast to Cash Transfers, PW programs do not merely seek to transfer income to the poor. First, most PW programs entail a self-targeting and employment-on-demand component that not only raises incomes but also improves individual risk management, which could increase productive investments among the poor. Given that the targeting of Cash Transfers is rarely able to react as quickly to changes in individual and household circumstances, we would expect the investment effects (per dollar transferred) to be higher in PW programs than in CT programs. Second, PW programs create employment and often have a wage setting role, which could affect labor supply, and demand for labor in the private sector. Third, some PW programs include an implicit or explicit training component, with potential effects on the income generating capacity of participants. Fourth, all PW programs create public goods. While the specific activities vary from program to program, most of them aim at improving market access through road construction or at raising the production capacity in agriculture, which could increase trade and production.

Building on the conceptual framework, we review evidence from 15 PW programs throughout the developing world. These programs have been selected on the basis of three criteria: First, the program is being or was operated in a developing country.[3] Second, the program falls within the definition of a PW program as used in this study, i.e. it provides income support in the form of wages in exchange for work and seeks to generate and maintain infrastructure or other public goods using a labor-intensive approach. Third, the program has been evaluated with experimental or quasi-experimental methods, and the results published. Note that descriptive (quantitative and qualitative) evidence is considered in exceptional cases, i.e. where it illustrates additional aspects that were not assessed or considered in other studies. Table A.1 in the appendix summarizes the main characteristics of the programs reviewed in this paper.[4]

[1] A comparison of the Benefit-Cost-Ratio (BCR) of all Cash Transfer and Public Works programs listed in the World Bank's ASPIRE database shows that PW programs have an average BCR of 0.31. For Conditional Cash Transfer Programs the average BCR is 0.42 (ASPIRE, 2017). The BCR is defined as the reduction in the poverty gap obtained for each 1$ spent in the program.

[2] We acknowledge that there might be differences in the behavioral effect of earning cash by working or receiving it as a gift on participants. However, we are not aware of any study that analyzes this point explicitly.

[3] Given the focus on developing countries and on labor-intensive approaches, PW programs in Eastern Europe and Central Asia have been excluded from the review. PW programs in Eastern Europe differ considerably from the programs run in developing countries, in terms of implementation and the type of employment generated. See Azam, Ferré, and Ajwad (2013) for details.

[4] Of the programs reviewed here, only the PSNP in Ethiopia did provide in-kind transfers. However, the impact evaluation results (see e.g. Gilligan, Hoddinott, & Taffesse, 2009) do not allow to differentiate between the in-kind and cash transfer. The study further shows that the program had little impact on food security. In light of the limited evidence from the programs included in this review, we cannot speak to nutrition trade-offs between Cash Transfer programs and food-for-work programs. For further reading, Ahmed, Quisumbing, Nasreen, Hoddinott, & Bryan (2009) provide a detailed account of different livelihood programs and their contribution to food security and nutrition in Bangladesh.

The PW programs reviewed in this paper can be classified into three broad categories according to their duration and objective: programs providing short-term (crisis) relief; programs with a medium-term focus as part of a broader social protection and poverty reduction intervention; and employment guarantees. The majority of the programs reviewed have been implemented on an *ad-hoc* basis in response to economic crises or rising food prices either due to drought shocks or following the 2008 global food price hike.

Our review shows that: First, standard short-term PW interventions are insufficient for fostering productive investments among participants. The average income transfer resulting from these programs is typically too low and too unpredictable to induce participants to step up their investments. Programs which provide reliable access to employment and secure repeated benefits over time, e.g. in the form of an employment guarantee, achieve better results. This could also be true when PW programs are combined with complementary services such as credit. Second, the extent to which PW programs affect wages, and private-sector employment, depends on the wage level, the amount of employment generated, and local labor market conditions. If PW programs offer a significant amount of employment at higher-than-market wages, they will induce upward pressure on wages. Such wage effects may increase the welfare of program participants and non-participants. However, unintended effects such as increases in child labor, school drop-outs and shifts towards more capital intensive production patterns, even firm shut-downs are possible. Third, the existing evidence suggests that skills development and training components, implicitly or explicitly included in many PW programs do not have significant effects on the employability or business earnings of the poor. Fourth, the review shows that we do still not have a good enough understanding of the productive effects induced by the infrastructure and other public goods generated as part of the PW interventions, making it an area where more research is urgently needed.

This paper contributes to three strands of literature. First, it adds to the literature on transfer programs and their contribution to economic growth (Alderman & Yemtsov, 2014; Barrientos, 2012). Our paper, however, differs from existing works in two aspects: While previous studies review social transfers and safety nets more broadly, we concentrate on PW programs specifically. Also, these studies focus on the macroeconomic contribution of safety nets on economic growth. While it is often claimed that PW can promote growth, the evidence to support this claim is difficult to obtain and scarce. We therefore break the results chain down and concentrate on the immediate productive effects of PW programs, which in the long-run should impact economic growth at the macro level. Second, this paper also contributes to the overview literature on PW programs (Del Ninno et al., 2009; Lal, Miller, Lieuw-Kie-Song, & Kostzer, 2010; Lieuw-Kie-Song et al., 2011; Subbarao et al., 2013). While previous works have mainly focused on reviewing different design options of PW programs (Subbarao et al., 2013), and their potential as safety net interventions (Del Ninno et al., 2009), we provide a review of the available empirical evidence with respect to four specific effects of PW programs. Finally, this paper adds to the literature on the optimal design of development interventions and their cost-effectiveness and efficiency (see e.g. Blattman & Ralston, 2015; Fiszbein, Kanbur, & Yemtsov, 2014; McKenzie, 2017). In contrast to previous works, we are particularly interested in comparing the costs and benefits of PW programs with other poverty reduction programs.

The remainder of this paper is structured as follows. Section 2 presents the conceptual framework. Section 3 reviews the empirical evidence of the productive effects of PW programs and their underlying causal mechanisms, and Section 4 concludes.

2. How can public works programs enhance productivity?

PW programs can have a range of effects on productivity and growth among poor households that go beyond the effects that can be expected from Cash Transfer programs. As a means of organizing the empirical findings, this section presents a conceptual framework that highlights the different mechanisms through which such productive effects could materialize. Fig. 1 summarizes the conceptual framework.

The framework distinguishes four mechanisms through which PW programs could trigger productive effects. First, many PW programs provide employment on demand, which could improve individual risk management and increase productive investments among participants. Second, employment creation also changes conditions on labor markets, i.e. wage increases, which could affect labor supply, and demand for labor in the private sector, therewith potentially benefitting or hurting PW participants and non-participants. Third, some PW programs include an implicit or explicit training component, with potential effects on skills and the income generating capacity of participants. Fourth, PW programs aim at creating public goods. While the specific activities vary from program to program, most of them aim at improving market access through road construction or at raising the production capacity in agriculture, which could increase trade and production. These mechanisms will be described in more detail in the following.

Productive investments: Productive investments – in the form of farm assets, capital stocks or investments in human capital – can be triggered among participants through two causal links. First, the increase in the disposable income of participating households should increase their investments. Second, having access to a PW program could improve the risk management capacity of households, which in turn can increase their willingness to undertake productive investments.

Because PW programs mean to raise the disposable income of participants, participants should be able to accumulate savings, and ultimately use these savings for productive purposes. Several studies have shown that the transfer of cash to households increases their productive investments. Participants in Opportunidades, the Mexican Cash Transfer program, were found to invest part of the income received in their own farms or enterprises (Gertler, Martinez, & Rubio-Codina, 2012). Rises in disposable income could also positively influence the willingness to take risks (Andersson, Mekonnen, & Stage, 2011).[5] To the extent that both PW and Cash Transfer programs raise available incomes, we do not expect this channel to play a more important role in PW programs than in CT programs, except for differences in the amount and predictability of transfers.

In contrast to CT programs, however, PW programs can improve individual risk management by making employment, and hence income, available upon demand, such that participants can access employment when they particularly need it (Barrett, Holden, & Clay, 2004; Binswanger-Mkhize, 2012). The idea is that, when faced with shocks, individuals and households can use the PW program to generate additional income. Cash Transfer programs, in turn, rely on objective wealth measures for targeting, which makes it much harder for such programs to respond to short-term changes in household welfare. While it is generally possible to increase the amount of transfers and expand the number of bene-

[5] In the context of PW programs, the increase in disposable income – and hence additional investments – will be most pronounced for individuals with the lowest amount of forgone income, because they stand to gain the most from participating in PW programs. These are unemployed or underemployed individuals or individuals who would earn only low wages (because of a low level of skills) outside the PW program.

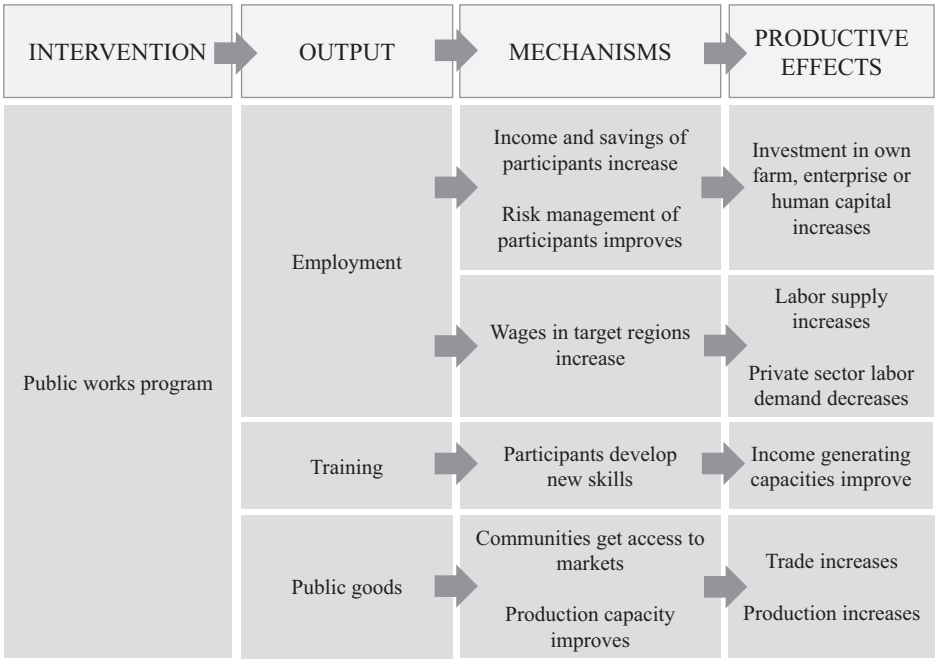

Fig. 1. Conceptual framework.

ficiaries in response to large-scale shocks, Cash Transfer programs are in most cases not able to respond to short-term idiosyncratic shocks.

If access to the PW program is sufficiently reliable, then this should enable participants to reduce buffer-stock savings and increase productive investments. Improving the risk management capacity of households could therefore lead to higher investments among participants as it is generally agreed that uninsured risk constrains households in their investment decisions. Evidence shows that uninsured risk prevents the investment in capital (Dercon & Christiaensen, 2011; Karlan, Osei, Osei-Akoto, & Udry, 2014), and induces households to adhere to low-risk and low-profit production techniques or occupations (Bianchi and Bobba, 2013; Gehrke, 2017). Such an insurance mechanism should be particularly relevant for households that are highly exposed to shocks, i.e. for farm households, workers in the informal sector and entrepreneurs.[6]

Labor demand and supply. One of the advantages of PW over CT programs is the self-targeting potential of PW programs: by paying below-market wages, PW programs can rely on the differential opportunity costs of time of the poor and non-poor as targeting instrument (Besley & Coate, 1992). In practice, however, almost all PW programs pay above market wages or offer working conditions that are superior to the private labor market. Depending on the size of these programs, they can induce labor supply and demand responses which would not be observed in CT programs. From a theoretical perspective, these effects could either hurt or benefit participants and non-participants of PW programs.

If PW programs pay above-market wages and offer employment to a large number of participants, these programs can be expected to change private-sector wage levels and working conditions. Private-sector wage levels change if participants (threaten to) reallocate their labor supply from other sectors to the PW program. This puts pressure on employers to adjust wages.[7] It is worth noticing that higher private-sector wages could be the intended outcome of PW programs, for example, if private-sector wages are constantly below minimum wages in contexts with limited state capacity and high market power of employers.

Wage increases can have a number of effects on labor supply and demand, which need to be taken into account. First of all, wage changes can affect total labor supply in target regions. Wage increases trigger income and substitution effects, such that the net effect on labor supply is essentially an empirical question. Increasing household – and especially female – labor supply could raise disposable incomes, consumption expenditures, as well as investments in human capital (Atkin, 2009; Heath & Mobarak, 2015).

But, wage increases could also induce employers to adopt labor-saving technologies and hence reduce private demand for labor and private-sector employment in the targeted areas, potentially with serious consequences for those who are supposed to benefit from PW programs. The extent to which wage changes affect private-sector labor demand depends on the structure of the labor market (Basu, Chau, & Kanbur, 2009). In a competitive labor market, an increase in equilibrium wages would induce changes in the production technology towards more capital-intensive production and reduce private-sector labor demand. However, there is substantial evidence to suggest that labor markets are not perfectly competitive, neither in developing nor in developed countries (Bardhan, 1979; Card & Krueger, 1995; Datt, 1996; McCord,

[6] Employment guarantee schemes such as the Indian MGNREGA are particularly suited for this because they entitle individuals to access employment when needed and stipulate this access as a right (Lieuw-Kie-Song et al., 2011). However, other well-functioning, long-term PW programs could have similar effects.

[7] Similarly, work conditions could change due to the introduction of PW programs. If PW programs introduce and consistently monitor decent working conditions, such as by setting standards for decent hours and safety at work, providing childcare facilities at work etc., private-sector employers could be pressured to offer similar working conditions in order to continue to attract workers (International Labor Organization, 2012). While a number of PW programs have guidelines on health and safety and also provide childcare facilities at work sites – as in the case of the EPWP in South African and the VUP in Rwanda – there is so far no evidence to what extent these programs comply with work standards nor whether these standards have spill-over effects to the private sector. This issue will therefore not be taken further.

2005). In monopsonistic markets, wages are typically lower than the marginal revenue of labor, and an increase in private-sector wages does not necessarily reduce the demand for labor. In such a setting, welfare gains from a PW program would be substantially higher, because PW programs would increase efficiency in the economy, and participants and non-participants would benefit from increasing private-sector wages.

Income generating capacity. Income generating capacities can improve where PW programs enhance participants' skills through on-the-job or formal training. The transfer of skills can raise the quality of labor supply, boost the employability of participants or increase their business earnings (see e.g. Lal et al., 2010). This would positively affect participants' future earnings as well as the economic development of the targeted regions.

Where skill acquisition happens through on-the-job training, PW programs could have a clear advantage over CT programs, in which the transfer of skills can merely happen through complementary training modules. On-the-job training is arguably cheaper because it does not require special provisions. However, the quality of skills acquisition and the transferability of these skills to the private sector depend greatly on the type of works undertaken and the degree of continuity in individual tasks. Given that PW activities are typically low-skilled and short-term (McCord, 2005), the degree to which this actually happens is difficult to predict.

Some PW programs, such as the Jefes y Jefas program in Argentina, the Programa de Apoyo Temporal al Ingreso (PATI) in El Salvador and the EPWP in South Africa, incorporate more formal training components in their program design (Del Ninno et al., 2009). These training components are of longer duration and do not necessarily take place on-the-job. However, such longer term commitments can be in conflict with the aim of PW programs of providing *ad-hoc* employment to those who need it. Depending on the size of the training component relative to the work component (in terms of the time taken up by each), PW programs could appeal to different groups, with some joining because of the training component and others because of the work component. If the training component becomes too large, the self-targeting mechanism of PW programs could fail. Instead of attracting workers who need the income most, the program would then attract workers who seek to benefit mostly from the training, i.e. relatively young workers and maybe even members of higher income groups.

Hence, it is unclear why training and PW should be provided in one and the same program, unless the training module has a direct bearing on the works being undertaken. In such cases, the training module can only be short-term or has to be completed before or in parallel to the works being carried out. A key question then is how to ensure that workers attending the training also subsequently participate in the PW program. One solution might be to make payments only after participants have completed both, the course and the PW program. However, this might make the program unattractive to low income groups, who would not be able to pre-finance consumption.

Alternatively, the training module and the PW program could be delivered as separate sub-projects, each with its own approach to targeting and delivery. However, in this case, the training module needs to be evaluated as program in itself, and it is not clear whether combining PW programs with training would have an effect on skills development above and beyond the effects of a Cash Transfer program that is combined with a training module.

Increases in trade and production. Increases in trade and production in the targeted regions can be expected from the creation of productive infrastructure or other public goods that improve market access or increase production capacities. These activities are a major component of PW programs, and account for a substantial share in overall program costs. The degree to which these activities benefit development is therefore an important aspect in evaluating the merits of PW programs *vis-à-vis* alternative interventions.

The creation of public goods, such as road construction or flood control can reduce transaction costs and facilitate the traffic of goods and persons from and to targeted areas. This should enhance trade and raise incomes. Agriculture related productive infrastructure such as cereal banks, storage and marketing facilities, water harvesting, irrigation, erosion control and fire prevention can raise the level or value of agricultural output. Other types of public and private infrastructure could enable farms and businesses to operate more effectively and increase their output (water supply, sanitation and drainage works and access to electricity).[8]

Some of these activities have been evaluated in contexts other than PW programs. For example, it has been shown that road construction facilitates the access to markets and reduces poverty in rural areas (Khandker, Bakht, & Koolwal, 2009). To the extent that we know what the productive effects of some of these types of infrastructure are, the question arises if the effects should be different when construction takes place in PW programs. One aspect that comes to mind is that the scale of intervention might be very different. Many PW programs take a community-centered approach in project selection, which often leads to a wide variety of different activities being undertaken at relatively small scale (Christian, de Janvry, Egel, & Sadoulet, 2015; Shuka, 2012). Also, PW programs tend to have explicit targets regarding the labor intensity of the activities being undertaken. Lastly, the involvement of the community at different stages of project implementation might affect the quality and therewith the returns to these investments.

Alternative mechanisms. There are two additional mechanisms through which PW programs could have productive effects in targeted areas which are not considered in the empirical analysis. First, the delivery of community services (e.g. child development projects) and social infrastructure (e.g. schools, public sanitation and health centers) through PW programs, could lead to greater human capital accumulation in the long-run, but such effects cannot be captured in standard impact evaluations. Second, the process of increasing income and consumption in rural communities could have multiplier effects on economic development in the targeted areas if production levels are also raised (Lieuw-Kie-Song et al., 2011). However, these multiplier effects are not specific to PW programs, and could equally be expected in Cash Transfer programs.

3. Evidence on the productive effects of public works programs

This section organizes available findings from the literature on PW programs along the four mechanisms through which we expect productive effects to emerge as outlined in the conceptual framework. Where possible it discusses design options and framework conditions that facilitate or inhibit productive effects to materialize.

3.1. Productive investments by participants

A number of impact evaluations have studied the effects of PW programs on asset accumulation and productive investments. Most of these studies do not attempt to trace the causal mechanism

[8] More recently, PW programs also target the rehabilitation of environmental services, for example, through mangrove reforestation, which could increase tourism (see e.g. Altenburg, Fischer, Huck, Kruip, Mueller, & Soerensen, 2015). However, little empirical evidence exists about the effects of such types of activities.

Table 1
Design characteristics of selected PW programs.

PW program	Time horizon of participation	Duration of employment created (on average per year)	Wage levels	Combination with financial programs	Outcomes
THIMO (Cote d'Ivoire)	6 months	110 days	Equal to statutory market wage	No	Savings; entrepreneurial activity
PSNP (Ethiopia)	Three years and longer	17–62 days	Below market wage	Yes, credit	Investment if participation lasts longer than three years or where combined with credit
MGNREGA (India)	No limit to duration of participation	15–76 days, varies across states	Above market wage	No	Savings; investments (where reliable); entrepreneurial activity
MASAF PWP (Malawi)	One year	12–48 days	Below market wage	Yes, fertilizer subsidy	No effect on fertilizer use
KEP (Nepal)	No limit to duration of participation	10–15 days	Below market wage	No	Savings
VUP (Rwanda)	One year; since 2012, retargeting every two years	42–48 days	Below market wage	Yes, credit	Savings
YESP (Sierra Leone)	No limit to duration of participation	50–75 days	Below market wage	No	Savings; entrepreneurial activity
CfW (Somalia)	One year	Up to three months	Below market wage	No	Savings

Source: Reviewed literature.

underlying the observed effect, i.e. is an investment the result of higher income and the capacity to accumulate savings or does it stem from the improved risk management capacity of the targeted households? Nevertheless, the programs reviewed vary quite a bit along their design characteristics, allowing us to draw a number of interesting conclusions. Table 1 lists the characteristics of those programs for which we could find evidence on productive investments.

The evidence reviewed in this section comes from eight programs. Three of these programs, i.e. the PSNP, the VUP and the MGNREGA, have been evaluated using quasi-experimental approaches, i.e. difference-in-differences (DID), regression discontinuity and instrumental variable approaches or a combination of them. The DID approaches used to estimate the effects of the PSNP and the VUP compare program participants and non-participants. Studies on the MGNREGA exploit the sequenced introduction of the program, which arguably provides more robust results. Three programs were evaluated in a randomized control trial (RCT): the Malawi Social Action Fund (MASAF), which was evaluated in 2012, almost 20 years after the initial launch of the program, the Youth Employment Support Project (YESP) in Sierra Leone, and the Travaux à Haute Intensité de Main d'Oeuvre (THIMO) in Cote d'Ivoire. For two programs we can only draw on non-experimental evidence: the Karnali Employment Program (KEP) in Nepal and the Cash for Work (CfW) program in Somalia.

In most PW programs reviewed, participants were able to increase their income and savings. Savings can be used as buffer-stock – to smooth consumption in case of a shock – or to increase capital stocks and income from agricultural and self-employed activities. It seems that rises in productive assets, mostly livestock, are observed only where households had access to PW programs for several years. In contrast, where participants participate in PW programs for only a limited amount of time, rises in asset levels are usually short-lived and quickly reversed in case of shocks.

Experimental evidence shows that participants of the YESP in Sierra Leone are 16% more likely to participate in informal saving groups and also more likely to invest in small livestock (Rosas & Sabarwal, 2016). Similarly, in a survey of program participants of the Karnali Employment Program in Nepal, 20% of them reported using KEP funds to buy animals, land, agricultural tools or mobile phones (Nepal National Planning Commission, 2012). Both programs do not limit the duration of participation. In contrast, the Somali Cash for Work program limits participation to one year. While participants of the CfW seem to invest their wages productively at first, evidence from semi-structured interviews suggests that this impact is neither widespread nor sustained over time (FAO Office of Evaluation, 2013). In the VUP, evidence from a DID approach suggests that participants had quite high savings rates of around 20%, and were able to increase livestock holdings – but only at the very beginning of the program. The degree to which these effects were sustained seems to depend on the duration of participation: Households that benefited continuously from the program showed higher livestock holdings also in the medium-term, while households that benefited from the program for only one period fell back to their asset levels prior to participation (Hartwig, 2014).[9] Similarly, using DID estimations, Andersson et al. (2011) and Berhane et al. (2013, 2014) show that the duration of support matters for asset accumulation in the Ethiopian PSNP, with participants only showing livestock improvements after five years of program participation. The only PW program that offered participation for a limited amount of time and still seems to have triggered lasting investments is the THIMO in Cote d'Ivoire. Bertrand et al. (2017) show in a RCT that participants have higher earnings from self-employed activities 12 to 15 months after the program ended. It seems worthwhile to mention, however, that the THIMO increased incomes of participants by roughly 50% every month for a duration of 6 months, which is significantly higher than the monetary transfers observed in other programs.

Combinations with other government programs, such as programs that improve access to credit, appear to be very promising because investments can then be made earlier. Gilligan et al. (2009)[10] as well as Hoddinott, Berhane, Gilligan, Kumar, and Seyoum Taffesse (2012) find that the PSNP in Ethiopia is effective in increasing borrowings, the use of agricultural technologies (such as fertilizer) and the probability of operating non-farm businesses

[9] What is striking in the VUP is that the observed accumulation of assets is very low, despite participants having access to a relatively large number of days of employment through the program. But because there is little predictability as to when these work opportunities will become available, there is little real additionality in the transfer.

[10] The study by Gilligan et al. (2009) is the earliest of the PSNP studies and largely based on a propensity score matching approach. Difference-in-differences estimates are only available for a limited number of outcomes.

only where it is combined with other food-security programs (OFSP).[11] These food-security programs aim *inter alia* at improving beneficiary households' access to credit. Consequently, Gilligan et al. (2009) find that beneficiary households are more likely to take up credit, and borrow higher amounts on average, than those households that do not benefit from both programs. This complementarity also seems to hold the other way around: OFSP participants are not more likely to invest more in agricultural technologies nor to produce higher yields unless they also benefit from the PSNP (Hoddinott et al., 2012).[12] In Malawi, by contrast, where the PW program was interlinked with fertilizer subsidies, participants were not found to make greater use of fertilizer (Beegle, Galasso, & Goldberg, 2017). This could *inter alia* be due to the fact that the program reassesses eligibility on an annual basis and therefore offers little income predictability beyond the current season.[13]

A greater willingness to incur risk in own production and to shift savings to productive purposes can also be observed where PW programs reliably generate a sufficient quantity of employment over a longer term. Exploiting a regression-discontinuity design (RDD), Zimmermann (2014) finds some evidence that households with access to the MGNREGA were more likely to engage in entrepreneurial activities, which she deems riskier than wage employment. She concludes that the MGNREGA functions mainly as an insurance tool by helping households cope with agricultural shocks and by encouraging them to take up risky but remunerative self-employed activities. Similar evidence was found in relation to the YESP in Sierra Leone, where beneficiary households were four times more likely to set up a new enterprise compared with randomly selected control households (Rosas & Sabarwal, 2016). Lastly, exploring the phased roll-out of the MGNREGA in DID approaches, Gehrke (2017) as well as Deininger, Nagarajan, and Singh (2016) analyze the effects of the program on households' agricultural production choices in one state of India. Both studies find that households with access to the MGNREGA are more likely to plant riskier and more lucrative crops. Gehrke (2017) also performs a number of robustness checks to make sure this effect can be attributed to the MGNREGA's insurance function.

Taken together, the evidence suggests that productive investments are hard to undertake from the accumulation of savings alone and that there could be important complementarities in combining PW programs with the access to credit. Even if the wages are relatively low, as long as employment is being provided in a predictable manner, PW programs will facilitate the repayment of loans, make participants more willing to take up credit and – if the transfer is sufficiently reliable – also increase the probability of obtaining loans from private credit institutions. Where a minimum level of employment cannot be maintained, there is no reason to expect an improvement in participants' creditworthiness. Alternatively, programs need to be sufficiently reliable in terms of the amount and timing of employment in order to foster productive investments. Long-term planning is crucial to this end. If employment opportunities are offered on an *ad-hoc* basis and there are no guarantees as to their duration, households will not be able to plan and adjust their investment behavior. The most successful programs were those that selected participants for longer periods (e.g. a minimum of three years) or had no limits to participation. Employment guarantees seem particularly promising in this regard but – as we have seen – are not a necessary condition. Most programs include a selection procedure. This can be used to increase the predictability of employment opportunities and make the program available for several years.

3.2. Labor supply and demand effects

As discussed in the conceptual framework, wage effects are usually expected when PW programs set wages above the market wage. Whether the price of labor actually rises, then, depends on labor market conditions, such as labor demand and labor supply elasticities. Very few impact evaluation studies have looked at the effect of PW programs on wages and the demand for labor. The majority of the studies draw on the Indian experience (see Table 2 for a summary of programs and evidence).

Only two of five studies are based on RCTs: the works by Muralidharan, Niehaus, and Sukhtankar (2017) in India and Christian et al. (2015) in Yemen. The remaining studies employ quasi-experimental approaches (Berg et al. 2017; Imbert & Papp, 2015), or are descriptive by nature (Wodon, 2012). All studies that look at second-round effects are (with one exception) quasi-experimental, and explore the sequenced roll-out of the MGNREGA in DID or RDD setups.

Quasi-experimental studies that explore the sequenced introduction of the MGNREGA in India have found that the program leads to a rise of about 5% in casual agricultural wages in the agricultural peak season (Berg et al., 2017; Imbert & Papp, 2015).[14] Imbert and Papp (2015) argue that the increase in agricultural wages is due to a reduction in the supply of labor to the private sector, i.e. the MGNREGA crowds out wage work and self-employment. They also document positive welfare effects on poor households who did not participate in the MGNREGA, due to rising private-sector wages. Similar evidence, albeit from a RCT that improved the effective presence of the MGNREGA in one state in the south of India, was provided by Muralidharan et al. (2017).[15] The authors find that the MGNREGA increased wages by 6.1%, leading to substantial welfare gains among the rural population (90% of which are attributed to increased private-sector earnings). In line with these findings and also based on a RCT, Christian et al. (2015) find evidence of an increase in private-sector wages due to the introduction of the Labor Intensive Works Program (LIWP) in Yemen. As in India, wages paid in the LIWP are higher than the market wage.

However, above-market PW wages can also leave private-sector wage rates unaffected if underemployment is high and the size of the program limited. In contrast to the effects in India and Yemen, no wage increases were observed in the Cash for Work Temporary Employment Project (CfWTEP) in Liberia, despite the program paying an above-market wage. While this entirely builds on descriptive evidence, Wodon (2012) argues that this could be due to the high labor surplus in Liberia and the limited size of the program. The results of the evaluation survey suggest that 76% of participants were either not active or unemployed prior to the program. Moreover, the program pro-

[11] Villegas, Smith, Atwood, and Belasco (2016) as well as Adimassu and Kessler (2015) also find that beneficiaries of the PSNP invest more in fertilizer than their non-participating counterparts. However, both studies draw on cross-sectional data and do not specifically assess the links with the OSFP.

[12] What cannot be assessed is whether this is mainly a demand-driven or a supply-driven effect. In other words, does the OFSP facilitate higher amounts of borrowing or are PSNP participants willing to borrow higher amounts?

[13] The authors assess in quite some detail why they find no effects on the two stated goals of the program, namely improving food security and increasing fertilizer application. However, a conclusive answer cannot be found.

[14] Zimmermann (2014) also looked at labor market outcomes and did not find that the MGNREGA affected employment or private-sector wages. However, her study suffers from low precision in the estimated coefficients due to her identification strategy.

[15] Muralidharan, Niehaus, and Sukhtankar (2016) show in a large-scale RCT that channeling MGNREGA wage payments through biometric smartcards in Andhra Pradesh substantially improved the performance of the program by reducing leakage, reducing payment delays and increasing access to MGNREGA work.

Table 2
PW programs and wage effects.

PW program	Wage-setting and level	Duration	Participants (% of pop.)	Outcomes
MGNREGA (India)	PW wage set at state minimum wage; above observed market wage	15–76 days, varies across states	57,801,470 (4.5%)	Rise in casual agricultural wage; decline in private employment
CfWTEP (Liberia)	PW above market wage for unskilled work	40 days[a]	17,000 (0.4%)	No increase in local wage rates or decline in private employment
LIWP (Yemen)	PW wage intended to be below market wage for unskilled work, but actually above market wage due to crisis	51 days	361,068 (0.6%)	Increase in average wages; reduction in private employment

Source: Reviewed literature.
[a] Indicates program target, no data on actual employment days available.

vides only a one-off work opportunity to participants. Those who have previously participated are not eligible to participate again if a second project is implemented in their community. While none of the studies calculated the rates of un- or underemployment in the study context, the PW programs in India and Yemen do indeed create a larger number of working days per participant on average than the CfWTEP in Liberia. Therefore, these programs are also more likely to put upward pressure on private-sector wages.

Interestingly, the increase in wages seems to be entirely restricted to the low-wage sector. In a DID setup, Berg et al. (2017) find no evidence that the MGNREGA affects wages for skilled work, indicating that labor markets in India are fairly segregated.

Much harder to assess are the economic implications of the wage changes. The few studies available are all from India. A number of studies (both experimental and non-experimental) find that the MGNREGA led to an increase in total labor supply, which seems to be driven entirely by increased female labor force participation (see e.g. Deininger et al., 2016; Muralidharan et al., 2017; Sheahan, Liu, Narayanan, & Barrett, 2016). Evidence from Andhra Pradesh suggests that this increase in female labor force participation has potentially positive effects on investments in children (Afridi, Mukhopadhyay, & Sahoo, 2016). But increases in the opportunity costs of time can also have negative consequences: Shah and Steinberg (2015) find that the MGNREGA increases the number of school drop-outs among adolescents at national level, which can be very harmful to human capital accumulation in the long-run. Although the MGNREGA bans minors from participating in the program, the authors present evidence that adolescents drop out of school because they replace their parents in farm or household work.

In terms of technology shifts, Bhargava (2014) finds that small-scale farmers shift towards labor saving technologies, and attributes this to the raise in wages. In contrast, Deininger et al. (2016) argue that the decrease in hired labor is entirely compensated by increases in family labor. Overall, there does not seem to be evidence for any large scale technology shifts which would affect long-term demand for labor in agriculture. Interestingly, however, some evidence points at reduced seasonal migration after the implementation of the MGNREGA (Imbert and Papp, 2016) and reduced labor supply to the industrial sector in urban areas (Agarwal, Alok, Chopra, & Tantri, 2016). According to Agarwal et al. (2016) firms shift towards more capital intensive production patterns; and they argue that increased wages reduce firm profits. However, it is unclear what the long-term implications of this technology shift are in terms of competitiveness, growth and employment creation.

The empirical evidence that is available thus suggests that PW programs indeed increase the price of labor in the private sector when PW wages are set above the market wage, and when the PW program is sufficiently large in terms of the number of beneficiaries and duration of employment provided. This increase in private-sector wages benefits participants and non-participants in the short-term. Evidence from India also shows that households increase total labor supply in response to wage increases. In the long-term, wage increases can have implications on school enrollment, and technology shifts in agriculture and other sectors. However, the evidence on these indirect effects is not always conclusive, drawn from one single program and it remains an open empirical question to what extent these findings replicate in other contexts.

3.3. The effect of skills development in PW programs on income generating capacities

Thus far, there is little systematic evidence of the effect of skills development in PW programs on the income generating capacity of participants (Hagen-Zanker, McCord, Holmes, Booker, & Molinari, 2011; Subbarao et al., 2013). However, programs that include a training component vary in the duration, topics and complementary support provided as part of training which still leads to a number of interesting conclusions. Table 3 summarizes the evidence and program characteristics.

The majority of the evidence presented in this section draws on non-experimental studies and observational data. Exceptions are the studies by Andersson et al. (2011) on the PSNP and Iturriza, Bedi, and Sparrow (2011) on the Jefes y Jefas, which both use a quasi-experimental approach. The most reliable information, however, comes from the THIMO which was assessed using a RCT (Bertrand et al., 2017).

Indicative evidence suggests that on-the-job training can improve participants' knowledge levels. However, the extent to which this knowledge translates into higher incomes *post* participation depends on the demand for these skills in the economy. In the case of the PSNP in Ethiopia, Lieuw-Kie-Song (2011) documents that 55% of the participants receive training on soil and water conservation technologies as part of their work assignment. 85% of the participants subsequently reported to apply the skills acquired to their own land, which potentially raised agricultural incomes. In the same context, Andersson et al. (2011) argue that the fact that PSNP participants acquired skills in forestry could be one potential explanation for the positive effect of the PSNP on tree holdings. In Yemen, participants of the LIWP mentioned in focus group discussions that they became more skilled in construction and masonry as a result of taking part in the program.[16] However, this did not have any direct employment effects due to the limited demand for construction skills in the local private labor market (Lieuw-Kie-Song, 2014).

[16] The transfer of skills from skilled to unskilled workers in the program is facilitated by participants working in small groups (of up to 10 people) with a skilled supervisor.

Table 3
PW programs, training, skills development and application and employment.

PW program	Training modality	Average duration of training	Topics covered and complementary support	Outcomes
Jefes y Jefas (Argentina)	Optional training course	4–6 h/week for the duration of PW participation	–	No effect on improved employability
THIMO (Cote d'Ivoire)	Compulsory training courses	160–200 h over a period of 4 months	Compulsory basic life skills course (incl. HIV-AIDS, citizenship). Treatment arms with basic entrepreneurship training (incl. market research and business plan development) or job search skills	Positive effect on earnings (mostly driven by participants of basic entrepreneurship training)
PATI (El Salvador)	Compulsory training course	80 h over a period of 6 months	Technical skills, business skills and targeted employment support (e.g. job interview preparation, job counselling and search assistance)	Positive effect on job readiness and willingness to start own business
PSNP (Ethiopia)	On-the-job training	–	–	Increased knowledge
CfWTEP/YEP (Liberia)	Compulsory training course	Variable	Technical skills, internships and employment search support	Positive effect on employment (paid & self-employment)
EPWP (South Africa)	Compulsory training course	Two days per month worked (average duration of employment: three months)	Various, including HIV/AIDS awareness, health and safety, vocational skills, life skills, business skills, co-operatives training	No improvement in unemployment
LIWP (Yemen)	On-the-job training	–	–	Increased knowledge

Source: Reviewed literature.

Programs with more formal training components have generated mixed results. Training components in South Africa's EPWP as well as the Jefes y Jefas program in Argentina cover a multitude of topics, including HIV/AIDS awareness, health and safety, social entrepreneurship, industrial relations, vocational skills, life skills, entrepreneurship, project management, community development and co-operatives training. In both programs, only very few participants seem to find employment in the private sector after PW participation (McCord, 2005; Government of South Africa, 2010; Iturriza et al., 2011). It seems that a focus on transferring specific technical or business skills is more promising than covering a multitude of topics. Also, providing job search assistance seems promising. The PATI in El Salvador offers targeted training in specific professions, e.g. training for car mechanics, electricians, tailors, bakers, chefs and florists. It also includes labor intermediation, which prepares participants for job interviews, gives job counselling and search assistance. An evaluation by the World Bank (2014) finds that participants' self-employment opportunities improve as a result of the program by improving job readiness and willingness to start a business. However, the study cannot say to what extent this can be attributed to training *vis-à-vis* the income transfer. Similar to the PATI, the training course in the Youth Employment Project (YEP) in Liberia is mandatory. Evidence from a beneficiary survey suggests that training has had a positive effect, since 64% of participants who have been trained since 2010 are either in paid employment or self-employed three years later (World Bank, 2015). The THIMO in Cote d'Ivoire probably provides the most reliable evidence as it was assessed in a RCT. It combined public works with business skills training in one treatment arm. But while post-program earnings are somewhat higher for participants who also benefited from this training, the impact on earnings is not statistically different between treatment arms (Bertrand et al., 2017).

The evidence from skills development courses outside PW programs casts their value into doubt. Technical, vocational and business skills training courses have become increasingly popular in recent years. However, empirical assessments of these programs show that most of them have not increased employability (see e.g. Blattman & Ralston, 2015; McKenzie, 2017). Furthermore, the dropout rates tend to be high, particularly among the poor. With average program cost between USD 1000 to 2000 per person, these programs are so expensive that the costs outweigh the benefits. This calls into question the cost-effectiveness of including formal training components in PW programs. Unfortunately, no detailed information on the cost of training activities in PW programs is available, such that this concern cannot be evaluated conclusively.

In summary, the following points are worth noting: Although on-the-job training can improve participant knowledge and skills at relatively low cost, its effect on employability depends on the demand for these skills in the local labor market. In formal training components, it seems to be imperative to identify appropriate and relevant contents. Formal training with a focus on technical skills and programs which provide complementary assistance with job searches are more likely to promote employability than training programs covering a multitude of topics. But, formal training components are very expensive and need a minimum amount of contact time for skills to develop, which might be at odds with the aim of PW programs of providing employment *ad-hoc* and on demand.

3.4. Increases in trade and production

There is still scant empirical evidence of the impact of public goods created within PW programs on economic activity. However, PW program evaluations now increasingly include assessments of the contribution of this infrastructure. Hence, more evidence should become available in the future. Thus far, most of the empirical evidence relates to the creation of productive infrastructure in agriculture, with the majority of studies assessing the effects on agricultural productivity or on transaction costs. Programs for which the effects of the productive infrastructure were assessed are summarized in Table 4.[17]

[17] Two additional programs are mentioned below: the CfW in Somalia and the VUP in Rwanda. For these two programs, however, we have no information on the productive effects of the infrastructure that was created.

Table 4
PW programs and the impact of productive infrastructure.

PW program	Type of infrastructure generated	Project selection	Outcomes
PSNP (Ethiopia)	Various, particularly water and soil conservation	Community level	Heterogeneous effects by type of infrastructure generated; positive effect of community participation on project maintenance; negative effect on project implementation
MGNREGA (India)	Various, including land improvements, irrigation, water body conservation, roads and maintenance	Government and community depending on state	Heterogeneous effects by type of infrastructure generated; community participation was not found to have had any effect
PNPM (Indonesia)	Various, particularly roads and irrigation	Community level	50% increase in production of unhulled rice
KEP (Nepal)	Various, including road maintenance, land rehabilitation and water and soil conservation	Community level	Positive effect on travel time
LIWP (Yemen)	Focus on water conservation but also covers road improvements and terrace reconstruction	Community level	Positive effect on water access, other effects not analyzed

Source: Reviewed literature.

Evidence from the LIWP in Yemen is based on a RCT, and evidence from the PSNP and MGNREGA on quasi-experimental approaches. The remaining evidence presented in this section (PNPM, KEP, CfW, VUP) is of descriptive nature.

Better infrastructure can lead to better market access, remove time constraints and directly affect agricultural productivity. The construction of irrigation channels such as in the PNPM in Indonesia, for example, prompted farmers to plant two or three rice crops a year because water was now also available during the dry season. This resulted in a 50% increase in the output of unhulled rice (World Bank, 2012). Further evidence of positive effects was also reported from the KEP in Nepal, where 80% of the participants interviewed said that they benefited directly from the construction of roads. They claim an average time saving of 0.7 days per week thanks to improved transportation (Nepal National Planning Commission, 2012). Positive though they are, these findings are perception-based and collected through beneficiary interviews. Hence, they should be taken with a grain of salt, as they are probably overstated. A more objective assessment of the impact of the LIWP infrastructure in Yemen was provided by Christian et al. (2015) who could exploit the randomized nature of the program implementation for the assessment. The authors show that, in villages with poor access to water, the LIWP reduces the average length of the trip to fetch water during the rainy season by 9 to 18 min. In addition, the improved access to water results in 1–2 fewer months (or a 50% decrease) of water shortage per year.[18] In a recent quasi-experimental study (using a GMM-IV approach) on the PSNP, Filipski, Taylor, Abegay, Taffesse, and Diao (2017) show that infrastructure projects lead to heterogeneous outcomes on grain and non-grain yields. Water and soil conservation activities increase grain yield by 2.8 percentage points. However, non-grain crops remain unaffected. Irrigation, on the other hand, seems to have a positive effect on vegetable yields but not on other crops (Filipski et al., 2017).

In the same vein, recent evidence suggests that not all infrastructure projects benefit the population to the same extent; some produce winners and losers. By comparing changes over time between villages with varying MGNREGA implementation intensity, Gehrke (2015) finds that while PW-generated infrastructure can positively affect outcomes in targeted villages in India, there is significant heterogeneity in terms of who benefits from which type of infrastructure. The results of her study suggest that land owners benefit from infrastructure related to land development, irrigation and water conservation. Households, who benefit from such infrastructure on their own land or close to their land, are found to cultivate more land, produce more agricultural output, make greater use of agricultural inputs and allocate more time to their own agricultural output. On the other hand, improvements in irrigation appear to reduce casual agricultural employment, possibly because of manual irrigation being replaced by mechanical irrigation. Infrastructure related to flood control seems to benefit the rural landless population most, who is generally engaged in casual agricultural work, increasing their mobility and thus their employment opportunities. Different effects for different groups are also documented in the CfW in Somalia where the generated infrastructure, particularly wells, caused conflicts between farmers and shepherds (FAO Office of Evaluation, 2013).

The usability and sustainability of the public goods generated is key to its long-term productive effects. While the infrastructure improvements produced by the VUP in Rwanda are generally perceived to be positive, more detailed information from an inventory of public assets generated shows that 20% of all the infrastructure created since the start of the program is either not in use or no longer existent (Hartwig, 2014). In particular, buildings (such as health centers and schools) and roads were often reported to have been damaged or washed away by heavy rains and landslides.

The degree of community involvement in project management and implementation can have a differential effect on the long-term benefits of the public goods generated. An assessment of the role of community involvement in the quality of public infrastructure projects in Ethiopia provides suggestive evidence that the timing and degree of community involvement matter (Shuka, 2012). Based on a sample of 118 soil and water conservation projects in Ethiopia, Shuka (2012) argues that the degree of community participation affects the quality and maintenance of these projects. Based on inventory assessments, she finds that community participation in project planning has a positive effect on project maintenance. However, increased community participation in implementation, including involvement in technical decisions, is negatively associated with project quality as measured by a project's operational state. This could be due to a lack of technical knowledge within the community, which could impair the quality of the infrastructure.

Existing evidence thus suggests that productivity enhancing effects are most likely obtained by infrastructure projects designed to raise agricultural output and enhance market access, e.g. in form of irrigation and water systems, soil rehabilitation and road construction. Different infrastructure projects are likely to benefit different groups. However, positive effects can only arise if the developed infrastructure meets a minimum standard of quality. So far too little evidence has been generated to justify the high

[18] Activities also included road construction. But at the time of the endline survey, these works had not been completed, such that its effects could not be assessed systematically.

costs spent on PW activities. For example, we do not know enough about the returns to road construction within PW programs. Are these roads of similar quality as roads constructed through other schemes which do not have minimum requirements on labor-intensity? To what extent does the scale and type of road construction matter? These issues are of paramount importance, and need to be addressed urgently in order to assess the benefits of the infrastructure and public goods generated by PW programs more conclusively.

4. Conclusions

This review seeks to understand how Public Works programs compare with other public interventions in terms of costs and benefits. In terms of net transfers received per dollar spent, Cash Transfers are generally more cost-effective than PW schemes. In light of this observation, we argue that PW programs should be preferred over alternative programs only if they strengthen the productive capacity of households in poverty beyond effects which could also be observed in Cash Transfer programs, and if this can be achieved to a degree that shifts the cost-benefit ratio in favor of PW programs.

The review concentrates on four causal mechanisms through which productive effects could materialize: productive investments of participants; labor supply and demand effects in target regions; training and skills development; and enhanced production and trade induced by the infrastructure and other public goods generated in PW programs.

Even though PW programs are a popular policy tool, our review documents a thin evidence base. To date, impact assessments have been based mainly on quasi-experimental approaches; randomized control trials of PW interventions are rare and have become available only recently. Also, the large majority of the available literature concentrates on short-run effects. Little to nothing is known about the potential long-run effects, which would be particularly interesting when thinking of the productive effects induced by the infrastructure and public goods created as part of these programs.

Despite the scant empirical evidence, a few papers stand out from our review and are therefore recommended to the reader for further reading. Murgai et al. (2016) provide a detailed account of the opportunity costs of time and foregone income associated with participating in a PW program. Rosas and Sabarwal (2016) provide a thorough account of investment effects of PW programs, with a particular focus on the usefulness of PW programs to address the youth unemployment crisis. Muralidharan et al. (2017) provide a very careful documentation of the wage and labor market effects of the MGNREGA in India. Bertrand et al. (2017) assess the usefulness of training components in PW programs targeted to urban youth. Finally, Beegle et al. (2017) provide a very careful assessment of Malawi's Public Works program, which serves as reminder that not all PW programs will necessarily have positive welfare effects.

Taken together, the evidence, on which this review builds, does not support the view that PW programs generate substantial productivity effects over and beyond those of alternative interventions. While the benefits of PW programs could theoretically go far beyond those of Cash Transfer programs, the empirical evidence that is available to date by and large does not support these claims. We find that short-term PW programs do not foster investments among participants, because transfers are typically too low and too unpredictable. Only where predictable and continued support is provided, e.g. in form of an employment guarantee, or where programs are combined with additional credit interventions, we see positive investment effects. With respect to the labor supply and demand effects, our assessment is inconclusive. When programs are large in size, they do put upward pressure on private-sector wages and – at least in the Indian context – have positive welfare effects also on workers outside the PW program. However, unintended effects can arise here, and be substantial: The wage effects might, for example, increase child labor and school dropouts, or lead to technology shifts away from a labor-intensive towards a more capital-intensive production. Complementary or on-the-job training as part of PW programs has thus far proved to be little effective in triggering productive effects for the poor. Furthermore, combining PW programs with formal training might undermine the self-targeting mechanism inherent to PW programs, as the training component is likely to attract different groups than the PW component. Finally, we still have far too little evidence of the productive effects of the infrastructure and public goods generated through PW programs, and in particular on the returns to these investments. Existing studies seem to suggest positive effects, but it is not clear how these gains relate to the cost of generating this infrastructure. Positive evidence was found where infrastructure projects are designed to raise agricultural output and improve market access, e.g. in the form of irrigation and water conservation, land development and rehabilitation, flood control and road construction. However, these positive effects are only likely to arise when minimum quality standards are met. While community participation seems to be essential to ensure the maintenance of the infrastructure generated, even with a community-centered approach, technical support and expertise are necessary to ensure project quality.

Arguably, a conclusive assessment of the costs and benefits of PW programs relative to alternative interventions needs more evidence than is currently available. But a couple of issues stand out, which are worth mentioning. Designing effective PW programs is challenging, and as so often: the devil is in the detail. In many cases it seems that the program could have generated substantially higher benefits, if it were more carefully designed. Thus, acknowledging this complexity and striving for more experimentation with design options is paramount. In terms of mechanisms, the three most promising mechanisms are the increase in investments via an insurance mechanism, an increase in private-sector wages in the context of malfunctioning labor markets, and the productivity effects of public infrastructure and public goods created within PW programs. These three mechanisms remain severely under-researched, and thus provide large scope for future work.

Conflict of interest

None declared.

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Appendix A

See Table A.1.

Table A.1
Programs reviewed.

PW program (country)	Objective	Year of implementation (status)	Beneficiaries (as% of population)	Annual cost in USD million (% of GDP)[b]	Training/complementary interventions	Target population	Activities
Jefes y Jefas (Argentina)	Short-term (crisis) relief	2002 (ended)	2,000,000[a] (5%)	500 (1.0%)	Training option	Households with an unemployed head of household	Community social works
PLANE (Bolivia)	Short-term (crisis) relief	2001 (ended)	120,000 (1.1%)	18 (0.2%)	None	Jobless aged 25–50	Maintenance of public spaces and roads
THIMO (Côte d'Ivoire)	Short-term (crisis) relief	2012 (ended)	12,666 (0.06%)	3.9 (0.01%)	Compulsory training with different arms	Un- and underemployed youth (men and women) aged 18–30	Road construction and maintenance
PATI (El Salvador)	Short-term (crisis) relief	2009	40,000 (0.6%)	50 (0.1%)	Compulsory training	Vulnerable urban households	Various, from infrastructure rehabilitation to social services
PSNP (Ethiopia)	Medium-term poverty reduction	2005	6,889,910 (10%)	500 (1.0%)	Credit	Chronic food-insecure households	Soil and water conservation
MGNREGA (India)	Employment guarantee	2006	57,801,470 (4.5%)	7,100 (0.4%)	None	Universal	Various, including road construction/rehabilitation, land development and flood control
PNPM (Indonesia)	Medium-term poverty reduction	2007	9,900,000 (3.6%)	550 (0.6%)	Various	Universal	Road construction, water and irrigation systems and electricity access
CfWTEP/YEP (Liberia)	Short-term (crisis) relief	2009; YEP since 2010	17,000[a] (0.4%)	3 (2.5%)	YEP training component	Vulnerable households	Road maintenance and land clearance
MASAF PWP (Malawi)	Medium-term poverty reduction	Mid-1990; amended in 2012	259,540[a] (7%)	37 (1.0%)	Fertiliser subsidy	Poor households with able-bodied members	Road rehabilitation and irrigation
KEP (Nepal)	Employment guarantee	2006	323,600 (1%)	2.5 (1.3%)	None	Households with no employed members	Road rehabilitation and water and irrigation systems
VUP (Rwanda)	Medium-term poverty reduction	2008	104,000[a] (6%)	43 (0.5%)	Credit	Poor households with able-bodied members	Various, including road construction/rehabilitation, land conservation and construction of health and education infrastructure
YESP (Sierra Leone)	Short-term (crisis) relief	2010 (ended 2015)	45,993 (0.7%)	25 (0.1%)	None	Individuals aged 15–35 in poor communities	Road rehabilitation, planting and environmental protection
CfW (Somalia)	Short-term (crisis) relief	2011 (ended)	780,000 (7.4%)	25 (2.7%)	None	Universal	Construction of water catchments and rehabilitation of water networks
EPWP (South Africa)	Medium-term poverty reduction	2004	350,068 (0.7%)	2,500 (0.7%)	Optional training	Unemployed people	Various, from infrastructure rehabilitation to community social services
LIWP (Yemen)	Short-term (crisis) relief	2005	361,068 (0.6%)	24 (0.8%)	None	Universal	Rehabilitation of land, water and road networks

Notes: Beneficiary and budget figures are based on the latest available year.
Source: Reviewed literature.
[a] Number of households benefiting.
[b] Latest available figures (years vary).

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