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Pakistan

Multipliers of Social Protection

Product 3 - Drafting the country case studies

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Multiplier effects of social protection in Pakistan: An empirical analysis

1. Introduction

Public expenditure on the social protection system is a crucial factor to ensure inclusive growth and human development. In addition to the direct impact of stimulating aggregate demand by increasing household consumption levels – an effective factor in responding to recessions and economic crisis, besides promoting economic growth -, the higher income security for households associated with investments in social protection can impact the economy through several channels. There is copious evidence in the literature that a higher level of social protection investment is an effective instrument in reducing poverty and inequality, paving the way for ensuring political stability by reducing the social tensions and conflicts within the country. Evidence also records the positive impact of cash (or in-kind) transfer programs on human development and productivity by i) addressing the issue of hunger and nutrition – providing better access to food and enhanced nutritional status; ii) reducing the health system's dependence on out-of-pocket payments leading to better and more equitable health outcomes; and, iii) contributing to better educational attainments and reducing child labor through assistance to families with free tuition, learning materials, school feeding programs, and removing the reliance on children on income-earning and care work (ILO, 2014, 2016, 2017; UNESCAP and ILO, 2021; Ortiz et al., 2015; Ortiz et al., 2019; Alderman and Yemtsov, 2012, 2014; Barrientos, 2011, 2012, 2013; Barrientos and Hulme, 2016; Gebregziabher and Niño-Zarazúa, 2014; Addison et al., 2015; Haile and Niño-Zarazúa, 2018; Gough et al., 2004; Atkinson, 1989, 1999).

Focusing on the impacts for generating inclusive economic growth, social protection – one of the four pillars of the decent work agenda[1] – generates access to full and productive

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[1] Promoting jobs and enterprise, guaranteeing rights at work, extending social protection, and promoting social dialogue are the four pillars of the ILO Decent Work Agenda, with gender as a cross-cutting theme. Source:
https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-lisbon/documents/event/wcms_667247.pdf, Retrieved 2021-06-17.

employment and decent work for all, including women and young people. Participation in the labor market, especially by women, is encouraged through cash transfers, active labor market measures, health insurance, and family support policies such as childcare and disability care. Also, income security presents a significant boost to entrepreneurship and other economic activities associated with higher risks and, therefore, higher returns. Unemployment benefits, especially unemployment insurance, provide unemployed individuals with time to find suitable jobs and thus helps adjustments in the labor force in the event of structural economic and labor market changes – potentially increasing the matching efficiency in the labor market. Moreover, social pension insurance plays an essential role of a productivity-enhancing mechanism by "taking over" (or "buying out") the increasingly unproductive older employees, thus reducing the productivity gap between older persons and younger employees (Gongcheng and Scholz, 2018; Cichon et al., 2004; Barrientos et al., 2003). At the same time, it also serves the social purpose of providing a continuation of certain income levels to older persons. All in all, social protection has a positive impact on productivity, local economic development, growth, and aggregate demand, thus supporting inclusive economic growth and social progress (Barrientos and Malerba, 2020).

In fact, coupled with the growing evidence regarding the benefits of increased investment in social protection, there is an increasing trend to support and encourage such measures by intergovernmental organizations and governments worldwide. As an elucidative example, the 2030 Agenda for Sustainable Development recognizes the central role social protection plays in achieving several of its goals. For instance, by contributing to ending poverty (Sustainable Development Growth – henceforth, SDG - target 1.3); achieving healthy lives and well-being (SDG target 3.8); gender equality (SDG target 5.4); decent work and economic growth (SDG target 8.5); and reducing inequality (SDG target 10.4). Consequently, the need for increased investment in social protection is also largely recognized in the 2030 Agenda, as reflected, for example, in SDG target 1.a on resource mobilization, calling for "adequate and predictable means" for developing countries, and SDG indicator 1.a.2 on monitoring the proportion of public spending on social protection, health and education, the ultimate aim of which is to "end poverty in all its dimensions".[2]

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[2] See, for instance, the United Nations' E-Handbook on SDG Framework and Metadata, available in *https://www.unescwa.org/ehandbook-sdg-framework-metadata*. Accessed 06-17-2021.

More specifically, addressing social protection, SDG target 1.3 advises countries to implement "nationally appropriate social protection systems and measures for all, including *floors* [emphasis added]" (United Nations, 2021); or, in other words, achieving universal coverage and appropriate social protection for all. This is predicated on the international standard – the ILO's Social Protection Floors Recommendation, 2012 (No. 202) adopted by governments, employers, and workers at the 100th Session of the International Labour Conference in 2011.

Despite the signs of progress made since the launch of the 2030 Agenda in 2015 – for instance, at least 23 low- and middle-income countries have achieved universal social protection coverage considering at least one social protection benefit (for example, access to old-age pensions) – a significant gap exists in coverage and financing social protection worldwide. The ILO (2017) reports that, globally, the coverage gap is a real and daily threat to 4 billion (55 percent of the world's population) people's lives and well-being. Deepening this global analysis, only 35 percent of children receive benefits from child allowances that enable them to receive childcare, better education, and several forms of nutrition. Besides, only 41 percent of women with newborns receive maternity cash benefits that provide them with income security during their children's critical first few months of life. Moreover, approximately 22 percent of unemployed people receive unemployment benefits, and only 28 percent of people with severe disabilities receive disability benefits. Older persons appear to be relatively better off compared to the four groups mentioned, with 68 percent of all persons above retirement age receiving a pension; however, the levels of their benefits are, in many cases, largely inadequate.

The situation in Pakistan, the focus of this report's analysis, is even more worrying. In terms of the sub-region within the Asian continent, in the South and South-West Asia, only 24 percent of the population is covered in at least one area of social protection (excluding health), compared to the average of 46 percent of the population for the whole ESCAP (United Nations' Economic and Social Commission for Asia and the Pacific) Region.[3] Nonetheless, Pakistan diverges from the average of countries in its sub-region, as only 9.2 percent of the population was covered by any social protection in 2018. In particular, only 5.4 percent of children receive any type of benefit (child allowances) in the country, while just 5.8 percent of older persons receives pensions, and only 1.7 percent

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[3] That includes East and North-East Asia, North and Central Asia, Pacific, South-East Asia, and South and South-West Asia (UNESCAP and ILO, 2021).

of persons with severe disabilities receive any type of disability benefits from the government (UNESCAP and ILO, 2021).[4]

The significant coverage gap worldwide is closely associated with low public investment in social protection, with more severe conditions in Africa, Asia, and the Pacific regions (ILO, 2017).

Again, Pakistan stands out among the countries in its region in this context, with public expenditures on social protection corresponding to only 1.9 percent of the GDP (Gross Domestic Product), while the average for countries in the ESCAP Region is roughly 7 percent of the GDP (UNESCAP and ILO, 2021). It is important to emphasize that this level of spending on social security seems quite inadequate, especially if we consider the country's general panorama. As a brief summary of the country's social situation, it is worth noting that, despite the significant economic growth of the last decades and a relatively low unemployment rate, 80 percent of the employed population are classified as informal workers. This fact points to a problem that potentially exacerbates the difficulties associated with the lack of social security coverage in the country – its possible concentration in a minority of the population that works in formal sectors of the economy. In addition, approximately a quarter of the Pakistani population lives below the poverty line (national measure), and more than 30 percent of the population lives under conditions of moderate or severe food insecurity (Markhof, 2020).

Since lack of social protection constitutes a significant obstacle to economic and social development, associated with high and persistent levels of poverty, inequality, and economic insecurity, there is a global consensus about the idea that extending social protection to all is a priority (Ortiz et al., 2019; Durán-Valverde et al., 2019). Along these lines, it is worth noting that Pakistani society has been seeking to expand the coverage of its social protection network, aiming, among other things, to reduce the level of poverty in the country.[5] In 2008, the "Benzair Income Support Program" (BISP) was launched, seeking to address the reduction of low-income families' purchasing power. This noncondional cash transfer means-tested program targets female heads of low-income

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[4] Based on the most recent available data for Pakistan on ILO's World Social Protection Database. For a complete country profile, see *https://www.social-protection.org/gimi/WSPDB.action?id=13*.

[5] For a detailed description of the current social protection system in Pakistan, as well as an historical perspective and future directions, see the most recent Pakistan Economic Survey (in particular, Chapter 15) – a report produced by the country's Finance Division – for the biennium 2020-2021 available at *https://www.pc.gov.pk/uploads/cpec/PES_2020_21.pdf*.

families and, according to Handayani and Buckley (2009), covered over 3 million families with an allocation of approximately US$425 million in 2008-2009 and rapidly extended its funding to roughly US$875 million in 2010. In a more recent effort, the Pakistani government developed a new program in early-2019 to broaden the country's social security network and reduce poverty. The "Eshaas Program"[6] was significantly extended in 2020, with "Ehsaas Emergency Cash" representing an attempt to alleviate the socio-economic impacts of the Covid-19[7] pandemic throughout the country. According to the Pakistani government[8], the emergency cash transfer program covers more than 15 million families and has a total budget of approximately US$ 1.21 billion, or about 0.59 per cent of the GDP (Markhof, 2020).[9]

Given the socio-economic situation described in the preceding paragraphs and the recent efforts from the Pakistani government to expand social programs, some crucial questions remain: can social expenditures, in fact, stimulate Pakistan's economy and generate inclusive growth? Do varied categories of governmental social expenditures present different responses regarding their impacts on promoting economic activity in Pakistan? What are the social expenditures with the most significant effect on Pakistani output growth considering an additional unit of investment (highest fiscal policy effectiveness)?

This report seeks to answer these questions by estimating the multiplier effects of four types of social expenditures in Pakistan. Although the literature on fiscal multipliers and the potency of fiscal policy (effectiveness) has grown significantly in the last decades (especially since the Global Financial Crisis), studies investigating the effects of social

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[6] According to the program's webpage, "Ehsaas is about the creation of a "welfare state" by countering elite capture and leveraging 21st century tools – such as using data and technology to create precision safety nets; promoting financial inclusion and access to digital services; supporting the economic empowerment of women; focusing on the central role of human capital formation for poverty eradication, economic growth and sustainable development; and overcoming financial barriers to accessing health and post-secondary education". (Eshaas *https://www.pass.gov.pk/Overview.aspx, Retrieved 2021-06-16).*

[7] Durán-Valverde et al. (2020) measure the financing gap in social protection due to the COVID-19 pandemic. The estimated financing gap in 2020, considering the impact of COVID-19 – to achieve universal coverage of a social protection floor comprised of five benefit areas, namely children, maternity, disability, old age, and health care – is around US$ 1,2 trillion in the developing countries. The study notes that "social protection systems are an indispensable part of a coordinated response to this crisis" and countries that have "strong health and social protection systems can react quickly by expanding and adapting existing social protection mechanisms".

[8] Eshaas Emergency Cash, *https://www.pass.gov.pk/Detailf90ce1f7-083a-4d85-b3e8-60f75ba0d788, Retrieved 2021-06-16.*

[9] Again, for a more detailed discussion on the several features and divisions of the Eshaas Programme, including future plans to expand the social protection system in the country see Chapter 15 of the Pakistan Economic Survey 2020-2021, available at *http://www.finance.gov.pk/survey/chapters_21/15-Social%20Protection.pdf.*

expenditures on the level and growth of aggregate output for Pakistan are scarce. In this regard, the current report contributes to the existing literature arguing in favor of the importance of social protection in generating sustainable and inclusive economic growth. The study's key finding is that one additional unit of social expenditures generates more than one unit of expansion in real GDP, albeit in varying degrees depending on the specific social expenditure considered. In particular, increases in Pensions and Allowances expenditures and Social Protection expenditures can generate output responses up to approximately 5 and 7 times, respectively, the initial investment over three years. These results have a strong policy implication not only in the short run – using social protection as a tool to combat crises such as the COVID-19 pandemic, as successfully done in Pakistan. It is also indicative of the importance of social protection in the building, in the long run, of a comprehensive, non-discriminatory, and gender-sensitive social protection system for inclusive and sustainable economic growth and potentially achieving the sustainable development goals of the 2030 Agenda.

The remainder of this report progresses as follows. In the second section, we present an analytical review of the literature on social spending multipliers, summarizing the existing arguments and results for different countries worldwide, and then focusing our analysis on the evidence for the Pakistani economy. The third section presents a detailed discussion of the methodology adopted in this report, which is followed in all the estimations presented throughout this report. The fourth section provides the sources of our data and the description of the variables of interest. In the fifth section, we present the results and discuss their relevance to the literature, highlighting the policy implications of our findings. Finally, the sixth and last section offers the concluding remarks of this report.

2. Social benefits and government expenditure multiplier: an analytical review of the literature

Since the Global Financial Crisis, there has been significant growth in the literature on fiscal multipliers. More precisely, in country-specific studies, the usage of linear VAR models (autoregressive vectors) to estimate the impact of an exogenous shock in public expenditures or government revenues on the level of economic activity has been the most common approach, following Blanchard and Perotti (2002). When disaggregating different government expenditures, this literature usually shows a higher and more

persistent multiplier effect of public investment than public consumption on output. In this context, only a few studies have focused on estimating the impacts of different social expenditures, namely income transfers (such as unemployment insurance or cash transfers) and social security, on economic growth. Blanchard and Perotti (2002) and Perotti (2004) treat transfers as a component that should be subtracted from total revenue – a strategy followed by several authors (Tenhofen et al., 2010; Lozano and Rodriguez, 2011; Peres, 2006; Peres and Ellery, 2009; Alves, 2017; Mendonça et al., 2016; Grudtner e Aragon, 2017; Jemec et al., 2013; Castro and Fernandez, 2011; Burriel et al., 2010; Giordano et al., 2007; Borg, 2014; Skrbic and Simovic, 2015; among others). Yet this strategy has been criticized in the recent literature (Gáldon, 2013; Gechert et al., 2018; Baum and Koester, 2011; Pereira and Wemans (2013)).

In that regard, Pereira and Wemans (2013) state that: "Initial studies applying the structural VAR methodology to fiscal policy adopted a very aggregate definition of budgetary variables, considering only taxes net of transfers, on the one hand, and public expenditure (fundamentally consumption and public investment), on the other. These definitions were used in a great deal of the subsequent work in this field. It is, however, plausible that the various headings that make up these aggregates have distinctive influences on economic activity". (Pereira and Wemans, 2013, p.10).

Moreover, Gechert et al. (2018) claim that, despite the existence of numerous studies on fiscal multipliers, social expenditures have not received nearly the same attention. According to the authors, this fact represents a relative paradox in the face of the growing importance of social expenditures: "In recent years there has been a tremendous surge in the literature on the size of fiscal multipliers. While many papers have focused on the effects of federal and local public procurement, employment and investment spending, and tax shocks, the impact of changes in social security contributions and benefits has received only limited attention. This seems surprising given the fact that social security systems have grown substantially in OECD countries after the Second World War and account for about half of the overall budget in countries like Germany". (Gechert et al., 2018, p.2).

While the implementation of the American Recovery and Reinvestment Act (ARRA) in the United States during the Global Financial Crisis has been partially justified in terms of larger multiplier effects of income transfers by the Council of Economic Advisers

(2009), only a few authors have estimated the effect of this type of expenditures on output. The existing literature that started from the conventional VAR approach of Blanchard and Perotti (2002) shows conflicting results, as shown in Table 1 below.

In short, some authors find significant multiplier effects for social expenditures (the impact multipliers is close to one) (Gechert et al., 2018; Gáldon, 2013; Adams and Wong, 2018), but, in some cases, the results suggest that the multiplier is non-persistent (the accumulated multiplier is close to zero) (Adams and Wong, 2018).[10] In other cases, the impact multiplier for social transfers is close to one, and the effect remains above zero in accumulated terms (Pereira and Wemans, 2013). Besides, some authors have even found a negative non-significant accumulated effect (Claus et al., 2006; Bruckner and Tuladhar, 2010).

Meanwhile, various studies estimate positive but very low multipliers for social transfers. In general, these other studies estimate higher multipliers associated with government consumption, cuts in direct taxes, and, mainly, public investments (Huseyin and Ayse, 2017; Sarangi and Bonin, 2017; Bova and Klyviene, 2019; Pereira and Wemans, 2013; Silva et al., 2013). In other cases, the multiplier for social transfers is large in absolute terms, but different types of expenditure show a similar or a higher multiplier effect on output (Pereira and Wemans, 2013; Fatás and Mihov, 2001; Pereira and Sagalés, 2009).

Moreover, Romer and Romer (2016) – using a "narrative method" based on episodes of fiscal expansion in different countries – find that permanent increases in social expenditures present significant and substantial impacts on consumption. Nevertheless, tax reductions appear to have the highest and most persistent multiplier effect, which could be explained, according to the authors, by a larger positive response of interest rates to an expansion in social expenditures. Similarly, Alesina et al. (2017) present result for a panel of OECD countries indicating that fiscal consolidations based on higher taxes are more costly in terms of output than those based on spending cuts – whether from government consumption spending or transfers. Meanwhile, Gechert et al. (2018) employ a similar methodology to the analysis of social spending in Germany and find a higher

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[10] The authors find lower multipliers in the long run (accumulated) and attribute the lower output responses to rising inflation and interest rates, proposing some kind of crowding-out effect.

and more persistent multiplier effect for social spending than for decreases in the social contributions that finance these expenditures.[11]

Besides, some studies have used panel techniques to estimate multipliers for a group of countries or states and regions within the same country via VAR or one-equation methods (Silva et al., 2013; Furceri and Zdzienicka 2012; Reeves et al., 2013; Ilzetski et al., 2013; Beetsma and Giuliodori, 2011; Valencia, 2015; Izquierdo et al., 2019; Carrière-Swallow et al., 2018; Deleidi et al., 2019; Konstantinou and Partheniou, 2019). Specifically for social expenditures, Furceri and Zdzienicka (2012) find a positive accumulated multiplier (but smaller than one) for a group of OECD countries, emphasizing the role of health expenditures and unemployment insurance as the components with greater impacts on output. Moreover, Reeves et al. (2013) estimate a positive social protection multiplier for a group of European countries[12], which reaches the value of 3 (baseline scenario). In their estimations, health expenditures present an even higher multiplier (near 4.9).

Table 1 presents a brief description of the empirical literature on the multiplier effects of social expenditures – from aggregate government spending to several decompositions of transfers – in different countries (or panel of countries), distinct periods and using several empirical approaches or econometric techniques.

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[11] The authors give the following explanation: "Given that benefits are likely pro-poor while contributions are paid by middle- and upper-income classes, it seems plausible that benefit shocks have a stronger aggregate demand effect. Moreover, some benefits are in-kind and will have a direct GDP effect". (Gechert et al., 2018, p.19).

[12] In this article, the authors apply a panel model instead of the traditional VAR: "Vector autoregressive models have been applied to quarterly data for small numbers of countries, but for annual data with larger numbers of countries fixed effects models are more consistent". (Reeves et al., 2013).

TABLE 1 – SUMMARY OF RESULTS ON THE EMPIRICAL LITERATURE OF MULTIPLIER EFFECTS OF SOCIAL EXPENDITURES

Study	Country	Period	Social Expenditure	Methodology	Multiplier Results
Adam and Wong (2018)	New Zealand	1990-2017	Transfers (social assistance and superannuation)	SVAR	1.53 (impact) and 0.76 (cumulative over one year)
Auerbach and Gorodnichenko (2014)	Japan	1960-2012	Government spending	Direct projections (based on Auerbach and Gorodnichenko (2013))	1.74 (peak) and 2.3 (cumulative)
Auerbach and Gorodnichenko (2014)	Japan	1985-2012	Government spending	Direct projections (based on Auerbach and Gorodnichenko (2013))	0.5 (peak) and 0.44 (cumulative)
Bayoumi (2001)	Japan	1981 – 1998	Government spending	VAR	0.65 (short-term multiplier)
Bova and Klyviene (2019)	Portugal	1995-2017	Transfers (old age, unemployment and disabilities transfers)	SVAR	-0.27 (impact) and 0.1 (cumulative)
Bruckner and Tuladhar (2010)	Japan	1990-2000	Local government expenditure on social assistance	One-equation methods	-0.25 (impact)
Dufrenot et al. (2016)	US	1960-2012	Transfers (Social Security)	Non-linear methods (MS/TVTP)	It reaches 1.68 (consumption) and 0.02 (investment); recession
Fatas and Mihov (2001)	US	1960-1996	Social security, other transfers and subsidies	VAR (Choleski decomposition)	Do not estimate multipliers directly but capture a positive and significant impact of transfers on GDP after eight quarters.
Furceri and Zdziniecka (2012)	OECD countries panel	1980-2005	Social expenditure (old age, incapacity-related, unemployment benefits and other expenditures)	One-equation method	Short-term multipliers: 0.6 (total expenditure), 0.9 (health) and 2.1 (unemployment benefits)

Gáldon (2013)	US	1948-2012	Social Security, unemployment benefits and other	Non-linear methods (TVPSV-VAR)	>1 (impact and long-run). Near 1.5-2 (long-run) at the end of the 2008/2009 crisis. Reaches almost 3 (long-run) at the end of 1950's and beginning of 1960's
Gechert et al. (2018)	Germany	1974-2013	Social Security	SVAR with "narrative" identified shocks	0.5-1.5 (impact)
Gechert and Ranneberg (2014)	Meta-analysis 98 studies	+1800 observations	Transfers	Meta-regression analysis	Between 2 and 3 (cumulative/recession)
Hollmayr and Kuckuck (2018)	Germany	1993-2017	Social expenditures (pensions/unemployment)	SVAR	2 (impact); between 0.3 and 3.8 (after 5 years)
Hur (2007)	South Korea	1979-2000	Government spending	SVAR	Between 1.2 and 1.6 (ten-period cumulative)
Huseyin and Ayse (2017)	Turkey	2002-2016	Transfers	SVAR	0.02-0.23 (impact)
Kanazawa (2018)	Japan	1980-2014	Public investment	Local projection/ IV method	4.95 (peak; 17th period – quarterly data)
Kuttner and Posen (2002)	Japan	1976-1999	Government spending	SVAR	1.06 (four-year cumulative multiplier)
Konstantinou and Partheniou (2019)	Panel of OECD and non-OECD countries	1991-2015	Social expenditures	Non-linear one equation	0.8 (OECD countries) and 0.076 (non-OECD); cumulative in two years; recession
Mahaphan (2013)	Thailand	1988-2009	Public investments and government consumption	VECM	0.6 (peak, 2nd period) for public investment, 0.09 (peak, 1st period) for government consumption
Miyamoto, Nguyen and Sergevev (2017)	Japan	1980-2014	Government spending	Local projection method (based on Jordà (2005))	1.48 (impact; when the nominal interest rate is near the zero-lower bound

					(ZLB)) and 0.71 (impact; other periods)
Orair et al. (2016)	Brazil	2002-2016	Social expenditures (pensions, social programs, and unemployment benefits)	Non-liner VAR (STVAR)	1.51 (peak) and 8 (cumulative in four years); recession
Park and Lee (2019)	South Korea	2000-2018	Government spending	VAR	1.09 (impact) and 1.68 (six-period, quarterly data, cumulative)
Pereira and Sagalés (2009)	Portugal	1980-2005	Public transfers	VAR	1.88 (impact) and 1.81 (cumulative)
Pereira and Wemans (2013)	Portugal	1995-2011	Social transfers in cash	SVAR	Near 1 (peak) and 0.6 (cumulative one year)
Reeves et al. (2013)	Panel of EU countries	1995-2010	Social expenditure	One-equation method	3 for social protection, near 4.9 for health.
Resende (2019)	Brazil	1997-2018	Social expenditure (pensions, social programs, and unemployment benefits)	VAR	0.72 (impact); 4.3 (cumulative in two years)
Romer and Romer (2016)	US	1952-1991	Social Security benefits	"Narrative"/VAR	Significant and great response of consumption (mainly in the impact) – but tax revenues had a higher effect in the analyzed period
Sanches and Carvalho (2019)	Brazil	1997-2018	Social expenditure (pensions, social programs, and unemployment benefits)	SVAR	0.75 (impact), 1.2 (peak) and near 3 (cumulative in two years)
Sarangi and Bonin (2017)	Egypt	1990-2015	Social expenditure	SVAR	0.04 (impact) and 0.17 (peak)
Silva et al. (2013)	Panel of Euro zone countries	1998-2008	Transfers - social expenditures in cash/in kind – plus subsidies and other expenditures	VAR	-0.118 (impact) and 0.82 (cumulative ten quarters); recession scenario
Tang, Liu, and Cheung (2013)	Thailand	1993-2019	Government spending	SVAR	-0.37 (impact)

Focusing now on the literature regarding Pakistan, first, it is essential to highlight that the specific literature on estimating fiscal multipliers is relatively scarce, especially regarding works with disaggregation of social expenditures. That said, the existing general evidence indicates that aggregate government expenditure positively affects the country's level of economic activity (Shaheen and Turner, 2010; Hayad and Qadeer, 2016; Khalid and Satti, 2016; Munir and Riaz, 2019, 2020; Ali et al.; 2020). Nevertheless, Ali and Ahmad (2010), using ARDL estimations, find that fiscal deficits positively affect economic growth in Pakistan up to some threshold level, and such deficits may harm the economic growth beyond that level. In a similar direction, Saba et al. (2015) present results using a structural VAR framework that an expansionary fiscal policy increased output only for the short and medium-run, with no significant effect in the long run for the Pakistani economy.

In studies more directly focused on government spending multipliers – primarily based on Blanchard and Perotti (2002) – Shaheen and Turner (2010), using the conventional VAR approach, find that government expenditure shocks raise real GDP in Pakistan after the second quarter and remains persistent for over five years after the initial shock. Tax cut shocks also positively affects the real GDP, although not significant for almost all periods. Khalid and Satti (2016) present similar results, using structural VAR (SVAR) to analyze the fiscal policy effectiveness in the country. The same authors also present a disaggregated analysis of those expenditures, although only dividing them into defense and interest payments expenses. The results indicate that defense expenditures positively impact on economic growth in Pakistan, while interest payments negatively impact on it.

Following a more disaggregated approach, dividing aggregate government expenditures between current and development expenditures (such as public investment), Munir and Riaz (2019; 2020) offer evidence that increases in government development expenditures increase real GDP relatively more than current expenditures. Also, further disaggregating the government's current spending, the authors find that real GDP decreases with increased subsidies, while it increases with social services and defense expenditure. These results partially corroborate the analysis presented in Mahmood and Sial (2012), which find statistically significant long-run relationships between government development expenditure and GDP (positive) and current expenditure and GDP (negative) for the Pakistani economy. Related to these results, it is interesting to highlight that Khan and Hashmi (2015) present evidence that development expenditures have diminishing effects

on income inequality, whereas current expenditures have no influence on the Gini coefficient. Thus, it seems that government development expenditures have, in addition to a positive effect on the product, a relevant social impact for the reduction of income inequality in Pakistan.[13]

Yet, in this regard, it is also important to highlight that the specific literature on the Pakistani economy lacks a more detailed and complete analysis of the impacts of social spending, especially investment in social protection, on the reduction of poverty and income inequality in the country. Given the broad discussion presented in this report's introduction, it seems straightforward to suggest that the expansion of social protection in Pakistan would be associated with extensive improvements in the living conditions of the population within the country, creating bridges to achieve inclusive economic growth and social development. The results of this report are a first indication in this regard, as we will see shortly.

Furthermore, in recent work using non-linear methods, thus allowing for regime switches according to growth regimes for the Pakistani economy, Ali et al. (2020) find that the response of output to positive government expenditure shocks is increasing in high growth regimes (economic boosts) and decreasing in low growth regimes (economic downturns).

Lastly, using VAR analysis for a panel of countries (Bangladesh, India, and Sri Lanka besides Pakistan), Hayat and Qadeer (2016) suggest that government expenditures have an overall positive impact on output in those countries and show that the effects of public investment are more remarkable than of public consumption. In an analysis that resembles the one presented in this report, although for a different disaggregation, the authors calculate that the average impact multiplier is 0.32 for public investment and 0.13 for public consumption. Moreover, the cumulative multiplier is 0.63 for investment and 0.40 cumulative for consumption.

In general, the related literature for Pakistan lacks empirical studies with a detailed and well-designed estimation of the effect of social expenditure and the associated multipliers for disaggregated categories of government spending. This report tries to fill this apparent

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[13] On this topic, Shirazi et al. (2001) indicate that the benefits from government expenditure in Pakistan are, on average, focused on lower-income classes, whilst the tax burden is relatively higher on the upper-income classes.

gap in the literature, and our results indicate that, in fact, increases in social expenditures positively impact on Pakistani output, and the respective estimated multipliers associated with specific types of expenditures vary in magnitude and temporality. In particular, Pensions and Allowances and Social Protection expenditures – components of current government expenditure – present the highest impacts on real GDP in the short and medium run, surpassing the effects of other current and development expenditures. These results partially contradict the earlier findings in the related literature.

3. Methodology

As seen in the previous section, most attempts to estimate the multipliers of different types of government expenditures make use of a structural VAR (or SVAR) approach.

The SVAR became well known in the literature of fiscal multipliers through Blanchard and Perotti (2002). The authors argue that the VAR methodology is appropriate for analyzing the effects of fiscal policy due to the consideration of lags that are characteristic of decision-making and implementation of government spending decisions. When dealing with relatively high-frequency data (monthly or quarterly), there is very little or no response of fiscal policy to contemporaneous unexpected shocks in output. In other words, GDP does not affect public spending contemporaneously because policymakers take more time than a quarter (or a month) to perceive the output shock and decide the next steps in fiscal policy, as well as to present them to the legislature. The purpose of the identification strategy is to isolate the exogenous shocks, recovering the structural shape of the shocks; that is, to obtain a non-recursive orthogonalization of the error terms.

The first step in the analysis is to estimate the vector autoregression in reduced form. In all the estimations presented in this report, the vector of endogenous variables is three-dimensional, including time series of expenditures, revenues, and output. As proposed by Sims (1980), it is a VAR model, where each variable is explained by lags of itself and the other variables of the model, being able to capture dynamic relationships. However, the reduced form shocks do not have economic significance (Castro and Hernandez de Cos, 2008). According to Perotti (2007), shocks of the reduced form (or "surprise" movements) can be seen as linear combinations of three components, namely: a) the automatic response of government spending and revenue to changes in output; b) the discretionary response due to changes in endogenous variables (Perotti gives the example

of tax changes in response to a recession); and c) random discretionary shocks: structural shocks, which are uncorrelated and unobservable (hence we need to recover them). Formally:

$$u_t^g = \alpha_{gy} u_t^y + \beta_{gt} e_t^t + e_t^g \tag{1}$$

$$u_t^t = \alpha_{ty} u_t^y + \beta_{tg} e_t^g + e_t^t \tag{2}$$

$$u_t^y = \gamma_{yt} u_t^t + \gamma_{yg} u_t^g + e_t^y \tag{3}$$

Where u_t^g, u_t^t, u_t^y are the unexpected movements in the expenditure, revenue and output variables, respectively. These "surprise" movements are the residuals in the reduced form, as it is the part of the data that is not explained by the VAR model. Moreover, e_t^g, e_t^t, and e_t^y are the structural shocks that are not correlated with each other by assumption and reflect the part of the "surprise" movements that is exogenous: it does not depend on policies and "normal" economic evolution (Coudret, 2013). Moreover, the coefficients α_{ij} reflect the response of variable i to variable j – the components (a) and (b) listed above are captured by the coefficients α. On the other hand, β_{ij} measures the contemporaneous response of variable i to a structural shock in variable j – that is, the component (c) in the previous list (Perotti, 2007).

Moreover, the coefficients α_{gy}, α_{ty}, γ_{yt} and γ_{yg} cannot be estimated without bias due to the existing instantaneous mutual relationship between output, expenditures, and revenues (Vdovychenko, 2018). In order to solve this problem, we follow a two-step procedure. First, we start from the identification hypothesis that we have already discussed in this section, thus removing component (b) and making the coefficients reflect only the first component – the response of the automatic stabilizer: "it typically takes longer than a quarter for discretionary fiscal policy to respond to, say, an output shock" (Perotti, 2007, p.176). The second step is, as suggested by Perotti (2007), using external information to the model to estimate the coefficients α_{gy} and α_{ty}.

In that sense, notice that we already know that α_{gy} reflects the contemporary elasticity of expenditure with respect to output and α_{ty} is the contemporary elasticity of revenues with respect to output. Besides, we also know that the α coefficients measure the discretionary response of fiscal variables to unexpected changes in output, as well as the automatic response (Jemec et al., 2013). Given the identification hypothesis, there is no discretionary response of fiscal variables to output so that these elasticities reflect only

15

the automatic stabilizer responses, as the use of quarterly data eliminates the discretionary component. Thus, the hypothesis of identification uses the following elasticity:

$$\alpha_{gy} = 0 \tag{4}$$

The elasticity of revenue with respect to output was estimated based on the "IMF method", as in Andreis (2014) and Maciel (2006), which is a regression using dummy variables for periods, outliers, and a trend control.

Besides, since u_t^g and u_t^t are correlated, from these separate estimations of the exogenous elasticities, we obtain the cyclically adjusted residuals $u_t^{g,ca}$ and $u_t^{t,ca}$ – which are the shocks without the effects of the cycle, in order to eliminate the automatic stabilizer responses. Thus, the component (a) is removed, so that we have exogeneity:

$$u_t^{g,ca} = u_t^g - \alpha_{gy} u_t^y = \beta_{gt} e_t^t + e_t^g \tag{5}$$

$$u_t^{t,ca} = u_t^t - \alpha_{ty} u_t^y = \beta_{tg} e_t^g + e_t^t \tag{6}$$

The structural shocks e_t^g and e_t^t can be obtained from the assumption of ordering the variables – that is, structural decompositions.

In that regard, Blanchard and Perotti (2002) claim that there is no reason to choose $\beta_{gt} = 0$ or $\beta_{tg} = 0$ a priori; that is, from a shock in spending and revenue, there is no theoretical or empirical justification to sustain which of the variables will react first. Perotti (2007) points out that, as the correlation between adjusted residuals is small, the order does not change the result. In this report, we used $\beta_{gt} = 0$ and estimated the regression by OLS of the adjusted revenue residuals on the residuals of the structural form of expenditures, to obtain β_{tg} following Equation (6), as done, for instance, in Burriel at al. (2010). The purpose of this regression is to obtain the estimates of the structural shocks – e_t^g and e_t^t. Such shocks are "isolated" from the influence of output because the automatic response component has been removed. It then becomes possible to make the shocks exogenous by removing the (a) and (b) components mentioned above.

Moreover, from Equation (5) it is possible to recover e_t^g using it to estimate Equation (6) by OLS (Burriel et al., 2010). We then obtain instrumental variables, the structural shocks e_t^t and e_t^g in Equation (3), since the regressors (residuals of the reduced form) are correlated with the error term (structural shock). Those structural shocks of the

expenditure and revenue are used as instruments since the correlation between them and the structural shock of output, e_t^y, is low. The instruments are estimated using Equations (5) and (6) and assuming $\alpha_{gy} = 0 = \beta_{gt}$. The last step is estimating the impulse-response functions using the estimated coefficients.

The basic model is estimated[14] using the vector of endogenous variables, in real terms: logarithm of social expenditures, logarithm of total primary revenue and the logarithm of output. Note that dynamic effects of public spending can also be analyzed using a three-dimensional SVAR by replacing total social expenditures by its different components and the aggregate GDP by household consumption and private investment (Çebi, 2015; Burriel et al., 2010).

Furthermore, regarding our main interest in this report – the estimation of the multipliers associated with the social expenditures –, Spilimbergo et al. (2009) indicate there are four main approaches to calculate expenditure multipliers: i) the impact multiplier, for the analysis of a short-run period, given by $\frac{\Delta Y(t)}{\Delta G(t)}$; ii) the horizon multiplier, for calculating the multiplier in a specific period of time, given by $\frac{\Delta Y(t+n)}{\Delta G(t)}$; iii) the peak multiplier, which represents the highest value in the period under analysis, given by $max \frac{\Delta Y(t+n)}{\Delta G(t)}$; and iv) the accumulated multiplier, that considers the total effect over a longer period of time, given by $\frac{\sum_{i=1}^{n} \Delta Y(t+i)}{\sum_{i=1}^{n} \Delta G(t+i)}$.

In short, the importance of calculating the impact multiplier is that it provides an assessment of fiscal policy in terms of immediate output response to a shock in the fiscal variable when the government aims to deal with a crisis, for example. Accumulated (or cumulative) multipliers, in turn, are essential in order to verify the impact of a random discretionary shock since the economy requires a certain amount of time to absorb the initial shock (Ilzetzki et al., 2013). The accumulated multiplier is equal to the ratio

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[14] The variables used in this report are not stationary and, therefore, their first difference are used (they are integrated of order 1), including the control variables, as showed by tests (Dickey-Fuller, Phillips and Perron, KPSS). Thus, the exercises are performed in terms of growth rate. We used the cumulative impulse-response function in order to obtain the responses in terms of levels. The number of lags is chosen based on the information criteria and the autocorrelation LM test (Matteo et al., 2018). When several information methods are used together, the literature recommends choosing that lag that most methods point to as being the most appropriate on (Lopes et al., 2012). Tests for autocorrelation (LM) and heteroscedasticity (White) pointed to the absence of these problems in most models. All models showed stability. The results of all diagnostic tests are presented in Appendix A.

between the accumulated response of output and the accumulated response of the fiscal variable subject to the shock. Thus, it measures the cumulative change in output after a cumulative change in the government spending over a given time horizon (Lozano and Rodriguez, 2011; Borg, 2014; Burriel et al., 2010; Tenhofen et al., 2010; Restrepo, 2020). Note that cumulative multipliers are also called integral multipliers, and their importance is emphasized by Restrepo (2020), who claim that: "The cumulative multiplier, according to Ramey and Zubairy (2018), may be a better representation when the effects of fiscal policy build over time". (Spilimbergo et al. (2009), Restrepo (2020)).

In order to calculate the multipliers, we need to divide the elasticity of the response by the average share of social expenditures in output (or its components). As the variables are in (natural) logarithmic form, impulse-response functions provide the elasticity of output or income (Y) with respect to the fiscal variable (X):

$$\xi_{Y,X} = \frac{\frac{\Delta Y}{Y}}{\frac{\Delta X}{X}} = \frac{\Delta Y}{Y}\frac{X}{\Delta X} = \frac{\Delta Y}{\Delta X}\frac{X}{Y} \tag{7}$$

According to Pires (2014), since $\frac{\Delta Y}{\Delta X}$ is the definition of the fiscal multiplier, which reflects a change in output given an increase of one unit in the fiscal variable, we therefore have the following result:

$$\frac{\Delta Y}{\Delta X} = \frac{\xi_{Y,X}}{\frac{X}{Y}} \tag{8}$$

To estimate the cumulative multiplier, we justify the number of periods based on Garcia et al. (2013), p.11: "The long-run multiplier is defined as the cumulative multiplier when $\rightarrow \infty$, but in practice is used the number of periods needed for the multiplier to stabilize at its long-run value". When the impact of social expenditures on GDP is more persistent, the cumulative multiplier is calculated for a longer period.

In this report, we estimate multiplier effects of social protection for Pakistan through several three-dimensional structural linear VAR. In all the estimations we follow the strategy used in Blanchard and Perotti (2002) and include three endogenous variables: logarithm of social expenditures (or its components), logarithm of total government revenues and logarithm of GDP (or its components). Based on the estimations, we generate cumulative impulse response functions in order to obtain the dynamic responses

of social expenditures on the level of real GDP. Then, as detailed above, we use these functions to get the elasticities of GDP in response to a shock in social expenditures and calculate the multipliers.

4. Database and data description

In this empirical-econometric exercise, we use the following series: **Social Security and Welfare** (annual data available in PRSP reports extracted from the Ministry of Finance's website); **Pensions and Allowance** (quarterly data obtained from CT data); and **Social Protection** (released annually by the Ministry of Finance). We also estimated an exercise for **Public Social Investment** (related to social issues, includes expenses such as "Roads highways, & Bridges" and "Water Supply & Sanitation". It is quarterly data, obtained from Ministry of Finance).

We transformed the annual series into quarterly frequency using a consolidated quarterly expenditure series from the government as an indicator in the "Denton-Chollete" temporal disaggregation method (available in the "tempdisagg" R package). Using this same package, an interpolation based on the Chow-Lin method showed similar results.

Tax revenues and consolidated government expenditures were also obtained from CT data. The quarterly series for real GDP was extracted from SBP Working Paper Series 97 (real GDP in 2006 prices, so we transformed this series into 2019 prices using a GDP deflator).

Figures 1 and 2 show the social expenditures series described above, deflated by the CPI to 2019 prices and seasonally adjusted through the X13 Arima method available in EViews. Estimations were carried out from 2002 to 2019 for Social Security and Welfare, Public Investment and Social Protection. For Pensions and Allowances exercise, estimation was performed from 2004 to 2019.

Figure 1 - Social Security and Social Protection (in millions of national currency PKR in 2019 prices, seasonally adjusted)
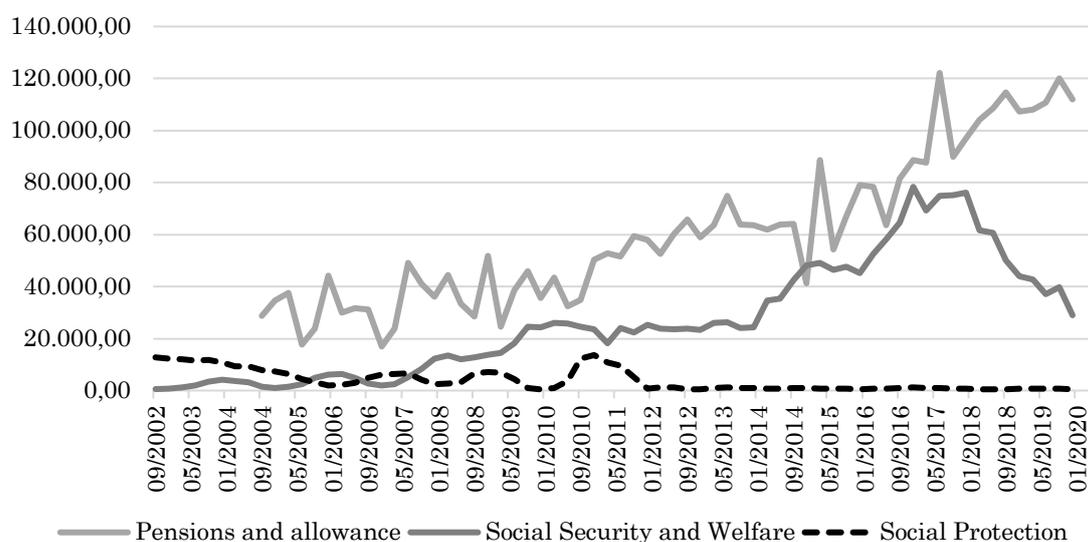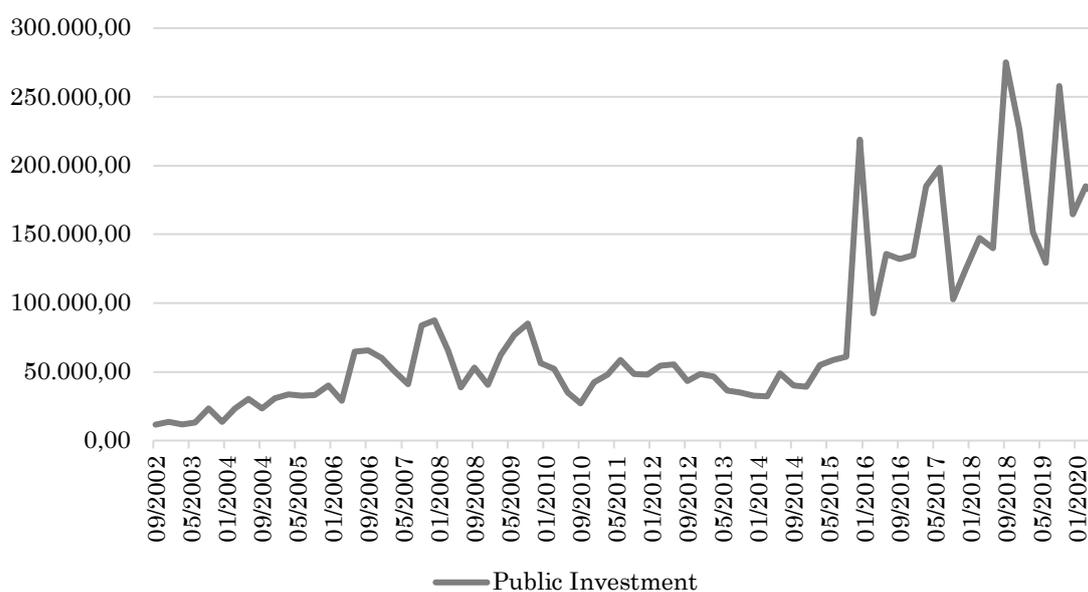

Figure 2 - Public Social Investment (in millions of national currency PKR in 2019 prices, seasonally adjusted)

It is interesting to highlight that from 2010, we have noticed an apparent increase in government spending on Pensions and Allowances and Social Security and Welfare. This behavior of both series seems to be related, as discussed in the introduction of this report, to the development and expansion of social programs in Pakistan, especially the BISP (Markhof, 2020). However, it is also important to note that Social Security and Welfare expenditures dropped from 2018 onwards, while Pension and Allowances maintain a

consistent growth rate. Meanwhile, the low investment in Social Protection in the country is noteworthy, a fact that is reflected in the social benefit coverage metrics described in the first section of this report – putting Pakistan in a relatively worse situation than the countries of its sub-region and also compared to the entire ESCAP Region in terms of social protection network (UNESCAP and ILO, 2021).

Finally, regarding Public Social Investment, despite the apparent variance of the series over the years, the change in the level of the series in 2015 and its constant growth in subsequent years is remarkable. In particular, this growth in Public Social Investment is related to the expansion of the "Public Sector Development Programme" (PSDP), the main component of development expenditure (as described in Pakistan's social accounting data).[15]

5. Estimation results

Based on the Structural VAR approach used in Blanchard and Perotti (2002), we estimated fiscal multipliers for different series of social expenditures in Pakistan. As discussed earlier, all the structural VARs were estimated using the three-dimensional vectors of the following variables in logarithmic form: expenditures on social protection, tax revenues and GDP. The first difference of each variable was used to avoid spurious relationships since all series are integrated in first order according to stationary tests (ADF, PP, and KPSS).

We also made other estimations using two different deflators as well as time dummies. Moreover, we used different social expenditure series as described above. Of course, we chose the specification that appeared to be better in terms of significance and robustness (according to LM and white tests).[16]

The chosen models were estimated using the following variables and specifications:

- First specification – "VAR 1": Pensions and Allowances (deflated by the CPI); tax revenues and GDP deflated by the GDP deflator; 4 lags; control variables: trend, Dum1415.

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[15] As can be seen, for instance, in Federal Government "Budget Brief 2020-21", available at *http://www.finance.gov.pk/budget/Budget_in_Brief_2020_21_English.pdf.*
[16] All residuals diagnostic tests and estimated coefficients for all VAR specifications estimated in this econometric exercise are presented in Appendix A.

- Second specification – "VAR 2": Public Social Investment; tax revenues and GDP deflated by the GDP deflator; 6 lags.

- Third specification – "VAR 3": Social Security and Welfare deflated by the CPI; tax revenues and GDP deflated by the GDP deflator; 2 lags.

- Fourth specification – "VAR 4": Social Protection, tax revenues and GDP deflated by the GDP deflator; 5 lags; control variables: Dum0809.

Note that the LM test detected autocorrelation in two model estimations (we detected autocorrelation in the first lag in VAR 1 and in lag 2 of VAR 3). The White Test suggests that the estimations are free of heteroscedasticity. Also, all models are stable. We included dummy variables in some cases, as indicated above: Dum0809 is a dummy variable to control for the global financial crisis; Dum1415 is a dummy for 2014 and 2015, in which we observed a different pattern of seasonality in the Pensions and Allowance series. We also tested a trend control. We should clarify that dummy variables were included if they were found to be statistically significant and if they were able to improve the properties of the model.

We tested two control variables: an effective exchange rate index (in first differences) and a real interest rate measure. Both variables did not show statistical significance – mainly in the output equation – and were therefore not included in the chosen estimations.

In the estimations, we obtain three different multipliers from each VAR, where Y is GDP and G, expenditure:

- Impact: instantaneous effect: $\frac{\Delta Y(t)}{\Delta G(t)}$.

- Peak: represents the highest value in the period under analysis: $\max \left[\frac{\Delta Y(t+n)}{\Delta G(t)} \right]$.

- Accumulated: measures the total effect of higher expenditures over time (n periods): $\frac{\sum_{i=1}^{n} \Delta Y(t+i)}{\sum_{i=1}^{n} \Delta G(t+i)}$.

Based on the specifications presented above, we explore the results of the proposed SVAR estimations in the next subsections, with special emphasis on the impulse-response functions of the types of social expenditure on output and the computation of the multipliers associated with such government expenditures. It is important to recall that all the diagnostic tests and estimated coefficients are presented in detail in Appendix A.

5.1. Effects of Pensions and Allowances on output

Following the first of the VAR specifications presented earlier, we investigate in this subsection the effects of Pensions and Allowances expenditure shocks on economic activity in Pakistan. Figure 3 presents the accumulated impulse response function of GDP to a shock in that disaggregated government expenditure.

Figure 3 - Accumulated response of GDP to a shock in Pensions and Allowances Expenditure
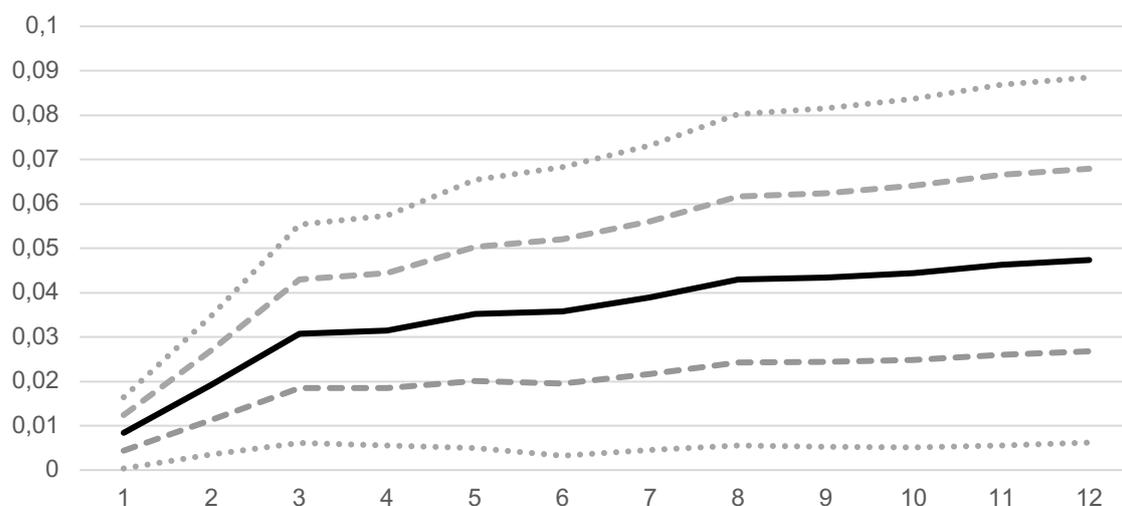
Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

From Figure 3, it is immediate to see that shocks in Pensions and Allowances expenditures positively impact on the Pakistani real GDP. Note that the accumulated responses are highly statistically significant (5% significance level) at all analyzed quarters. Besides, it is worth suggesting that the impact of a Pensions and Allowance expenditure innovation on the Pakistani real GDP achieves its peak almost two years after the initial shock (in the seventh quarter). Moreover, it is interesting to note that the output response to shocks in such social expenditure increases again in the last analyzed period, that is, three years after the initial government spending shock, almost reaching the same magnitude as the peak impact. Therefore, this fact is suggestive that the cumulative effect of increases in Pensions and Allowances Expenditures on the level of economic activity in Pakistan are not only quite substantial in the short and medium run but also in the long

run, which could be further analyzed in studies using "longer" time series for the social expenditures and the other variables of interest.[17]

Associated with the impulse response functions illustratively presented above, the estimated multipliers effects for Pensions and Allowance expenditure are the following: **0.8 (impact); 2.4 (peak, seventh quarter); 4.7 (accumulated over twelve quarters).** This result entails that a one-unit increase in Pensions and Allowances expenditures leads to a total expansion of 4.7 in real GDP after three years in Pakistan. Again, it is worth indicating that the accumulated impact of increases in this expenditure on Pakistani output can be even larger in the long run, as the responses are increasing by the end of the third year after the initial shock. Consequently, our results indicated that this component of the government's current expenditure significantly impacts the Pakistani economy, a result that differs from the findings in Mahmood and Sial (2012).

Moreover, it is worth highlighting the relationship of this initial result with the discussions presented earlier in this report about the importance of social protection as an engine of social development. As examined in the data description, Pensions and Allowances Expenditures grew substantially in Pakistan in the analyzed period, especially since 2008 as a result of the expansion of social programs such as the BISP. Given that the allowances associated with this program are focused on female heads of low-income families, it seems straightforward that the effects of those social expenditures on Pakistani society are far more profound than those directly measured by economic growth. Due to the design of the respective public policy, the reported strong positive effect on real GDP growth can be allied to the inclusion of women in the country's social development, as well as directly attacking poverty and food insecurity throughout the provinces. Thus, this first empirical result of the report already points to the key relevance of investments in social protection as a promoter of sustainable and inclusive economic growth in Pakistan.

5.2.   Effects of Public Social Investment on output

Moreover, focusing now on the second specification estimated in this paper, we examine the impacts of increases in Public Social Investment on Pakistani output. It is important

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[17] Subject to data availability, it would be interesting to examine the impacts of government fiscal policy choices on Pakistan's macroeconomic variables over the previous decades, using "long" time series (annual frequency) to capture longer-run relationships between social expenditures and economic and social development in the country.

to indicate that this government expenditure is a component of the development expenditures discussed in the literature (Munir and Riaz, 2019, 2020; Mahmood and Sial, 2012; Khan and Hashmi, 2015). Figure 4 shows the accumulated impulse response functions of output to a shock in Public Social Investment.
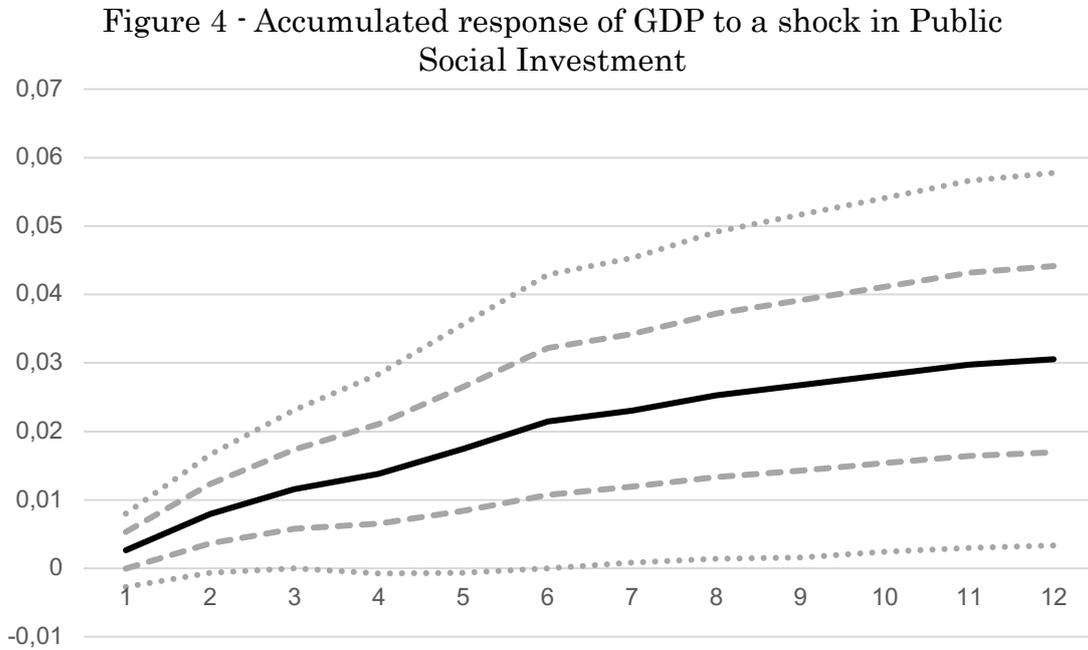
Figure 4 - Accumulated response of GDP to a shock in Public Social Investment

Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

In line with the existing literature, our empirical results show that increases in Public Social Investment positively impact on real GDP, and this positive impact increases over time, reaching its peak almost after three years. It is immediate to see in Figure 4 that, except for the first, second, fourth, and fifth quarters after the initial shock, all responses are positive and statistically significant at the 5% significance level (for the exceptions, it worthy noting that the responses are still significant considering a one standard deviation confidence interval).

The estimated multipliers associated with those output responses to Public Social Investment can be summarized as follows: **0.26 (impact); 3 (peak, eleventh quarter); 3.1 (accumulated over twelve quarters)**. Those results partially corroborate the estimations presented in Hayat and Qadeer (2016). Although the authors calculate the

average multiplier for a panel of countries, the estimated impact multiplier in their sample is 0.32 for public investment, near to our results focused only on the Pakistani economy.

It is also important to highlight that both the impact and accumulated multipliers for Public Social Investment are lower than the multipliers presented in the previous subsection for Pensions and Allowance expenditures. This might indicate that specific components of current expenditure can present higher multipliers than components of development expenditures for Pakistan, an important result that differs from the findings in Mahmood and Sial (2012) and Munir and Riaz (2019, 2020). In addition, given the impacts of increases Pensions and Allowances expenditures not only on the level of economic activity but also on social development, by representing a direct way to increase the disposable income of low-income families in the country, positively influencing the reduction of poverty and insecurity, this second result seems to be a further indication of the crucial role of social protection in Pakistan, with profound and more significant impacts than the already substantial effects of public investment on the country's development.

5.3. Effects of Social Security and Welfare on output

In the third specification, we investigate the effects of Social Security and Welfare expenditures on the real GDP in Pakistan. The accumulated impulse response function of output to a shock on this government expenditure is presented in Figure 5.

Figure 5 - Accumulated response of GDP to a shock in Social Security and Welfare
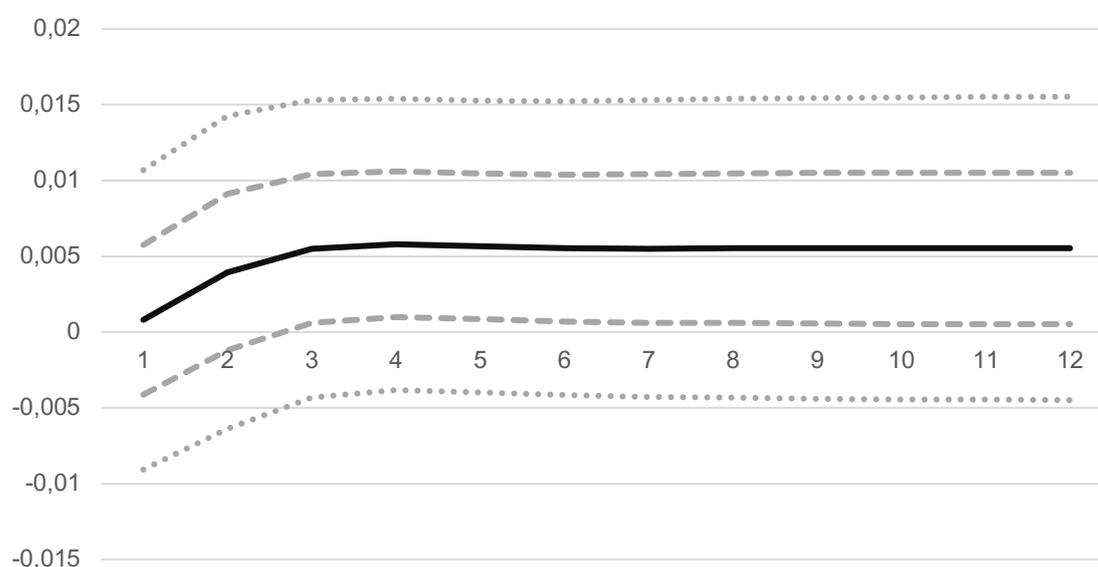
Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.
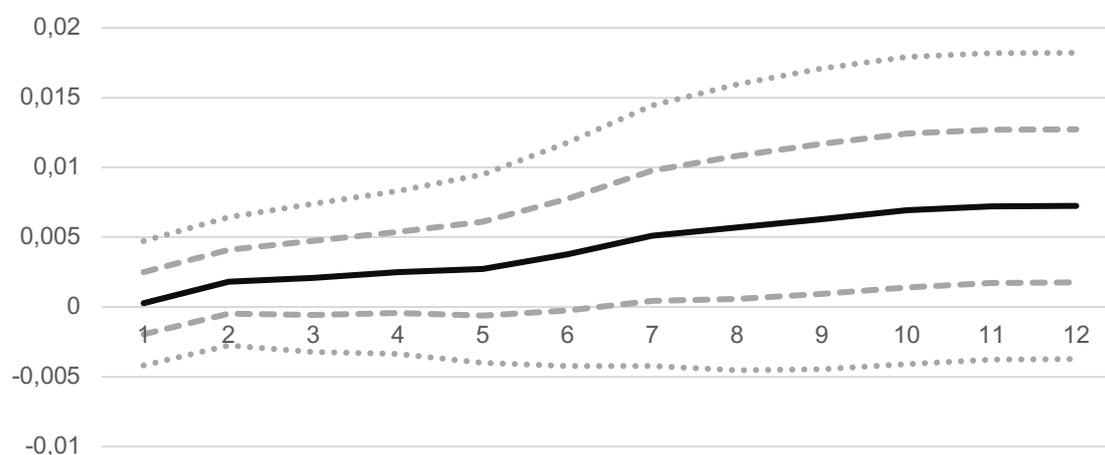
From Figure 5, we can conclude that the responses of real GDP to shocks in Social Security and Welfare expenditures are positive but lower than for the previously analyzed expenditures and are also less statistically significant – note that the responses are not statistically significant at the 5% significance level in none of the analyzed periods, although they are significant considering a one standard deviation confidence interval after the second quarter.

Moreover, the respective estimated multipliers associated with Social Security and Welfare expenditures are the following: **0.2 (impact); 4 (peak, third quarter); 1.5 (accumulated over eight quarters)**. This result indicates that a one-unit increase in Social Security and Welfare expenditures leads to a total expansion of 1.5 in real GDP after two years. In addition to it being much less statistically significant, the effects of this government expenditure on Pakistani real GDP are lower than the multipliers of Pensions and Allowances expenditures and Social Public Investment.

5.4. Effects of Social Protection on output

Lastly, let us now consider the fourth specification estimated in this report, examining the effects of Social Protection expenditures on the real GDP of Pakistan. Figure 6 presents the accumulated impulse response function of output to a shock in Social Protection expenditures.

Figure 6 - Accumulated response of GDP to a shock in Social Protection Expenditure

Similarly to the previous case, for Social Security and Welfare expenditures, the responses of output to Social Protection expenditures, as seen in Figure 6, although positive, do not present statistical significance at the 5% significance level for every period analyzed. However, when considering a one standard deviation confidence interval, the effects of this government expenditure on real GDP are positive and significant, mainly after the first year from the initial shock. This result indicates that the effects of these expenditures on the level of economic activity in Pakistan seem to occur substantially in the medium and long run, without significant impacts in the short run. As we will explore shortly, this may be related to the profound effects of expanding the social protection system on inclusive socio-economic development in the country.

Associated with the impulse response functions presented above, the respective estimated multipliers effects for Social Protection expenditure can be summarized as follows: **0.3 (impact); 6.5 (peak, tenth quarter); 7.2 (accumulated over twelve quarters)**. Note that, although output responses to this government expenditure are not highly statistically significant, the multipliers associated with those responses present large magnitudes, especially for the peak (in the tenth quarter after the initial shock) and the accumulated over three years. In both cases, those multiplier measures are more prominent than all other disaggregated expenditures examined in this econometric exercise. In particular, this result shows that a one-unit increase in Social Protection expenditures leads to a total expansion of 7.2 in real GDP after three years in Pakistan.

Again, as in the case of Pensions and Allowances Expenditures, it is certainly essential to stress that, in addition to the substantial effect on the level of economic activity captured in this result, increased spending on social protection has other profound effects on the country's development. As largely discussed in the literature, the expansion of the social protection network potentially affects several layers of the society, ensuring income security for families in delicate financial situations, which, in turn, has varied impacts in the economy, such as the expansion of access of women and young people to the formal labor market, the reduction of poverty and food insecurity (related to increases in labor productivity) and attaining better educational levels throughout the country. These effects are even more relevant when considering the social panorama presented for Pakistan, a

country with very low social protection spending and, consequently, coverage, but still marked by a high share of the population living in poverty situations. Thus, these results represent new evidence of the importance of investment in social protection for inclusive economic growth in Pakistan, serving as support for the policies recently adopted by the country's government (such as the expansion of the "Eshaas Programme") and also as a stimulus for greater social spending directed towards the components of social protection studied in this report.

5.5.   Summary of results and implications

After presenting the detailed results for each of the categories of social expenditures analyzed in this paper, by way of conclusion, it is worth briefly discussing a summary of the main results arising from our estimations and relate them to the existing literature, as well as to explore the policy implications of these results.

Table 2 summarizes the results for the estimated multipliers associated with the impulse response functions of output to shocks in social expenditures in Pakistan.

TABLE 2 - SUMMARY OF THE RESULTS FOR ESTIMATED MULTIPLIERS

Social Expenditure	Impact Multiplier	Peak Multiplier (in period "t")	Accumulated Multiplier (over twelve or eight quarters)
Pensions and Allowances	0.8	2.4 (Seventh quarter)	4.7
Public Social Investment	0.26	3 (Eleventh quarter)	3.1
Social Security and Welfare	0.2	4 (Third quarter)	1.5
Social Protection	0.3	6.5 (Tenth quarter)	7.2

First, our main conclusion from the results presented in Table 2 is that social expenditures – and here, we analyzed four different disaggregated expenditures – positively impact on economic activity in Pakistan. This result is in line with the related literature on fiscal policy impacts and effectiveness in the country. More importantly, the social expenditure

multipliers estimated in this report indicate that for all categories considered, an additional unit of investment generates more than one unit of increase in output in a relatively short period of time, possibly reaching from 1.5 to 7.2 units increase in output over three years of the initial shock. Nevertheless, it is essential to highlight that only the first two social expenditures of Table 2 – Pensions and Allowances and Public Social Investment – present impulse response functions that are statistically significant at the 5% significance level for almost all periods of analysis.

In particular, shocks in Pensions and Allowances expenditures – a component of current government expenditures – present consistent positive impacts on Pakistani real GDP with the highest impact multiplier between the social expenditures studied in this report, reaching its peak effect almost two years after the initial expenditure shock and actually accounting for an accumulated multiplier of almost 5 after three years. The two other components of current expenditure analyzed in this paper – Social Security and Welfare and Social Protection – presented relatively lower impact multipliers, although the accumulated multiplier after three years of the initial shock for the case of Social Protection is the highest among the estimated on this study: a one-unit increase in this expenditure leads to a total expansion of 7.2 in real GDP after twelve quarters. Therefore, our results indicate that increases in some components of current government expenditure positively impact the real GDP for Pakistan, pointing to a certain difference with respect to the results obtained in Mahmood and Sial (2012).

Moreover, our results regarding Public Social Investment, the development expenditure component considered in this work, indicate that increases in this expenditure positively and significantly impact output. The estimated impact multiplier of Public Social Investment, 0.26, is in line with the estimations presented in Hayat and Qadeer (2016), with an average impact multiplier of 0.32 for public investment considering a panel of four countries (Pakistan, India, Sri Lanka, and Bangladesh). It also important to highlight that, although the impacts of increases in Public Social Investment on output are milder in the short run (compared to the effects of increases in Pensions and Allowances expenditures), those impacts increase over time, reaching their peak almost three years after the initial expenditure shock. Compared to the average peak of the components of current government expenditure analyzed in this paper, it seems that the effects of Public Social Investment on the Pakistani real GDP take relatively longer to reach their peak. The accumulated multiplier (over twelve periods) of this expenditure, although

economically significant, is lower than those of Pensions and Allowances and Social Protection expenditures. Since we analyze the impulse response functions for a period of three years after the initial spending shock, it is possible to argue that the accumulated multiplier of Public Social Investment on output might be comparable to those of current government expenditure components in the long-run analysis.

However, our estimations indicate that some specific components of current government expenditure, in particular Pensions and Allowances and Social Protection, in fact, present higher multipliers (impact, peak, and accumulated) than components of development expenditures for Pakistan, a result that points to different conclusions than those reached in Mahmood and Sial (2012) and Munir and Riaz (2019, 2020). In a general manner, we present evidence that the disaggregation of government spending into current expenditure and development expenditure is relatively less relevant since specific components of each of these expenditures can impact the Pakistani economy with different magnitudes and temporalities. Thus, it seems more important to researchers and policymakers to focus, as done in this report, on the analysis and estimation of the specific effects of each particular type of expenditure on Pakistani output, calculating the impact, peak, and accumulated fiscal multipliers.

It is also worth noting that, in this report, we explore the impacts of increases in tax revenue on Pakistani output. The impulse response functions associated with such shocks and the estimated multipliers are presented in Appendix B. It is essential to highlight that, although the results are of little relevance in terms of statistical significance (non-significant at the 5% significance level for almost all periods analyzed), all the estimated accumulated multipliers over three years from the initial revenue shock are smaller than one.[18] This indicates that increases in social expenditures, in any of the categories studied here, stimulates the Pakistani economy much more significantly than any tax cuts. This result corroborates previous evidence present in the literature (Shaheen and Turner, 2010; Munir and Riaz, 2019, 2020; Ali et al., 2020).

Lastly, as a direct policy implication, our results indicate that increases in Pensions and Allowances and Social Security are, between the analyzed expenditures, the most

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[18] In this regard, it is interesting to point out that the accumulated multiplier of tax revenues on output is positive for one of the specifications estimated in this report. This indicates that increases in the Pakistani government's revenue positively impact the country's economic activity. Although counterintuitive when compared to others in the related literature, this result relates to the findings of Khalid and Satti (2016).

effective way to boost Pakistan's economic growth, especially considering the short-run and medium-run effects of fiscal policy. Moreover, it is essential to highlight that, especially in the case of Pensions and Allowances, output responses to the spending shock seem to grow at the end of the analysis period, which may indicate, as already discussed for Public Social Investment, substantial and significant long-run effects on the level of economic activity as well. This report's results become even more significant when we consider the effects of investments in social protection in addition to the direct impact on economic growth. Besides substantially boosting economic activity in the country, it is important to highlight that expanding the social protection network also affects society profoundly, reducing food insecurity, poverty, and inequality. By guaranteeing income security for low-income families, investments in social security can generate increased participation of excluded groups in the labor market and other instances of society (especially women) and increase the country's average labor productivity and education level. Therefore, our results strongly indicate that social expenditures can be seen as crucial for inclusive economic growth and social development in Pakistan.

In view of the Pakistani government's recent effort to expand its social security system, as can be directly noticed in reports produced by the Finance Division – such as the Pakistan Economic Survey 2020-2021 – with the development and extension of social programs, including highly impactful (in socio-economic context) cash transfers during the Covid-19 pandemic and its continuing restructure to a post-Covid scenario, the results of this report can be considered a significant stimulus in this direction. When providing detailed evidence that investments in social protection are quite effective in stimulating economic activity – comparing, for instance, with the ineffectiveness of tax revenues reduction – and potentially generating inclusive growth within the country, the results presented in this report can serve not only as a thermometer for the Pakistani government, suggesting the validity of measures already taken to raise investment in social security, but also as a compass, indicating the "best" direction for government social expenditure, with the main focus on Social Protection and Pensions and Allowances.

6. Concluding remarks

This report provides evidence of the impact of social protection expenditures on economic activity in Pakistan. The research methodology is robust as it resorts to a technique that allows using economic theory to transform the reduced-form VAR model into a system of structural equations, making it feasible to generates impulse responses that can thus be given structural interpretations.

Using quarterly data on Pensions and Allowances expenditures, Public Social Investment, Social Security and Welfare expenditures, Social Protection expenditures, total tax revenues, and real GDP over the period between 2002 and 2019, the findings of this report provide clear empirical evidence of a positive impact of social expenditures on Pakistani economic growth, which is in line with the literature. Our results show that the estimated multipliers for social expenditures are: 0.8 (impact), 2.4 (peak, seventh period), and 4.7 (accumulated after twelve quarters), for Pensions and Allowances; 0.26 (impact), 3 (peak, eleventh quarter), and 3.1 (accumulated after twelve quarters), for Public Social Investment; 0.2 (impact), 4 (peak, third quarter), and 1.5 (accumulated over eight quarters) for Social Security and Welfare; 0.3 (impact), 6.5 (peak, tenth quarter), and 7.2 (accumulated over twelve quarters) for Social Protection.

In short, the estimated results confirm that all peak and accumulated multipliers are above one, implying that one unit spending on social expenditures generates more than one unit of increase in output. In particular, the results indicate that increases in Pensions and Allowances and Social Protection (along with Public Social Investment, to a lesser degree) are associated with the most substantial boosts to economic activity in Pakistan in the short and medium run. These findings have relevant direct policy implications, as it serves not only as a stimulus for the continuation and expansion of social protection programs developed by the Pakistani government recently, but, most maybe importantly, indicates paths to improve the effectiveness of fiscal policy in the country, pointing in detail to specific components of government spending that most significantly impact the Pakistani economy both in periods of expansion and recession.

By suggesting the relevance of the effects of Pensions and Allowances and Social Protection on stimulating economic activity in Pakistan, this report helps to establish the case for public expenditure on social protection, which is critical in the building of a

robust, non-discriminatory, disability-inclusive, and gender-sensitive social protection system which is also socially effective and economically productive under both normal and crisis conditions. As such, the report paves the way for policymakers and analysts to engage in inclusive social dialogues, incorporating all stakeholders involved in building and strengthening social protection systems, to argue in favor of the importance of social protection in generating sustainable and inclusive economic growth.

By way of conclusion, it is essential to highlight some possible extensions related to this research that could significantly further improve the understanding of the impacts of social expenditures in Pakistan. First, it is worth pointing out a direct extension of this report, which is the estimation of similar multipliers for other components of government expenditures, following the research agenda to assess the effectiveness (or potency) of fiscal policy based on the examination of various disaggregated social expenditures. In addition, as mentioned in several passages in this report, it would be interesting to analyze the long-run impacts of social expenditure components, and therefore of government decisions in terms of fiscal policy, on key macroeconomic variables for Pakistan over the last decades, using time series with annual frequency and considering several years in the sample – something that was not possible in this research due to data availability. Finally, a highly relevant extension of this research would be to examine the impacts of the social expenditures analyzed here, especially those that make up the social protection network, not only on economic growth, as widely explored here, but on the various variables that can somehow capture inclusive social development in the country, which would provide further empirical substance to the suggestions based on the empirical results presented in this report. For example, empirical studies exploring the direct effects of social protection on poverty reduction and income inequality, as well as on educational level and food insecurity measures in the country, seem to be a promising and timely way forward.

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APPENDIX A – Estimated coefficients and residual analysis

In this Appendix, we present diagnostic tests and estimated coefficients for all VAR specifications analyzed in this report. First, it is important to clearly state that, in this Appendix, we consider the following typology for statistical significance when presenting the results: **** 1% / *** 5% (two standard-deviation bands) / **10% / *30% (one standard- deviation bands).

1. Pensions and Allowance specification – VAR 1

First specification – "VAR 1": Pensions and Allowances (deflated by the CPI); tax revenues and GDP deflated by the GDP deflator; 4 lags; control variables: trend, Dum1415. The following table summarizes the estimated coefficients of this SVAR.

TABLE 3 - VAR 1 ESTIMATED COEFFICIENTS

	Pensions and Allowance	Revenue	GDP
Pensions (0)			-0.007845***
Pensions (-1)	-0.768235****	-0.017934	0.007698**
Pensions (-2)	-0.777784****	0.054555*	0.010395***
Pensions (-3)	-0.357293**	0.029666	0.009696**
Pensions (-4)	-0.357619***	0.019840	0.003339
Revenue (0)			0.012801
Revenue (-1)	-0.020383	-0.472933****	0.009974
Revenue (-2)	-0.409839	-0.145353	0.019435*
Revenue (-3)	-0.340489	-0.359430***	0.020374*
Revenue (-4)	0.164434	-0.302662**	0.062748****
GDP (-1)	5.609205*	0.151461	0.056264
GDP (-2)	0.423628	-0.117399	-0.255686**
GDP (-3)	4.399317*	1.198820*	

			-0.055617
GDP (-4)	0.081483	1.034920*	0.325834***
C	-0.256142	-0.034168	0.018101**
Dum1415	-0.122557**	0.028634*	0.002831
Trend	0.013650	0.002094	-0.000656*

(0) It refers to the SVAR's contemporaneous response of GDP to social benefits and to revenues (if negative, the impact is positive due to matrix algebra).

Regarding the analysis of the residuals of this specification, the outputs below present the White, LM (autocorrelation) and VAR stability tests. We do not reject the null hypothesis of the White's test, which indicates that the residuals do not show heteroscedasticity. Also, the LM test reveals that there are no autocorrelation problems in this SVAR model, with the exception of the first lag. Finally, it is to be emphasized that this model is stable, as the roots of the characteristic polynomial are smaller than one in absolute value.

White test p-value: 0.2356

LM test p-value:

0.0068
0.4485
0.2005
0.2096
0.0657
0.0762
0.2340

VAR Roots (modulus)

0.855477
0.855477
0.853636
0.853636
0.830046
0.830046
0.799084
0.759051
0.759051
0.752371
0.752371
0.739784

2. Public Social Investment specification – VAR 2

Second specification – "VAR 2": Public Social Investment; tax revenues and GDP deflated by the GDP deflator; 6 lags. The following table present the estimated SVAR coefficients.

TABLE 4 - VAR 2 ESTIMATED COEFFICIENTS

	Public Investment	Revenue	GDP
Public Invest (0)			-0.002522*
Public Invest (-1)	-0.517476****	0.063034***	0.005647**
Public Invest (-2)	-0.235069*	0.027336	0.004754*
Public Invest (-3)	-0.130470	0.035767*	0.002376*
Public Invest (-4)	-0.161138*	-0.000840	0.007315**
Public Invest (-5)	-0.102525	0.065019***	0.004494*
Public Invest (-6)	0.339459**	0.023927	0.008456***
Revenue (0)			0.048947***
Revenue (-1)	-0.804129	-0.371704***	-0.032933*
Revenue (-2)	0.633622	-0.255741*	0.008708
Revenue (-3)	1.030484*	-0.288620**	-0.019917*
Revenue (-4)	2.063652**	-0.436842***	0.020619*
Revenue (-5)	1.057572*	-0.156158	-0.046557**
Revenue (-6)	1.058208*	-0.007754	-0.005199
GDP (-1)	-0.488121	-1.127821*	0.310698**
GDP (-2)	-4.487583	0.397096	-0.182604*
GDP (-3)	4.370483	0.919226*	0.039158
GDP (-4)	2.780597	-0.185274	0.421221****
GDP (-5)	0.141853	0.520796	-0.174608*
GDP (-6)			

	6.020436*	-1.246018*	-0.073472
C			
	-0.103639	0.033326*	0.006899***

(0) It refers to the SVAR's contemporaneous response of GDP to social benefits and to revenues (if negative, the impact is positive due to matrix algebra).

Similarly to the previous case, the outputs below present the White, LM (autocorrelation) and VAR stability tests. Note that we do not reject the null hypothesis of the White's test, which indicates that the residuals do not show heteroscedasticity. In addition, note that the LM test indicates that there are no autocorrelation problems in this SVAR model. It is also important to emphasize that this model is stable, since the roots of the characteristic polynomial are smaller than one in absolute value.

White test p-value: 0.4358

LM test p-values:

0.7601
0.5986
0.6080
0.5129
0.3335
0.2966
0.2887

VAR Roots (modulus):

0.912073
0.912073
0.896863
0.896863
0.890211
0.870269
0.870269
0.855089
0.855089
0.838099
0.838099
0.759363
0.759363
0.751397
0.704461
0.704461
0.546274
0.428052

3. Social Security and Welfare specification – VAR 3

Third specification – "VAR 3": Social Security and Welfare deflated by the CPI; tax revenues and GDP deflated by the GDP deflator; 2 lags. The estimated coefficients of this SVAR are summarized in the following table.

TABLE 5 - VAR 3 ESTIMATED COEFFICIENTS

	SSW	Revenue	GDP
SSW (0)			0.00389
SSW (-1)	0.791901****	-0.032400	0.009286**
SSW (-2)	-0.346477****	0.043021*	-0.003311
Revenue (0)			0.049536***
Revenue (-1)	0.660589*	-0.416115****	0.005051
Revenue (-2)	-1.189785****	-0.012420	0.002005
GDP (-1)	-0.754705	-0.469304	0.215577***
GDP (-2)	1.785093	-0.413322	-0.373387****
C	0.017816	0.027968***	0.012907****

(0) It refers to the SVAR's contemporaneous response of GDP to social benefits and to revenues (if negative, the impact is positive due to matrix algebra).

Regarding the analysis of the residuals of this specification, the outputs below present the White, LM (autocorrelation) and VAR stability tests. Note that we do not reject the null hypothesis of the White's test, which indicates that the involved residuals do not show heteroscedasticity. In addition, note that the LM test reveals that there are no autocorrelation problems in this SVAR model, with the exception of the fourth lag. Finally, it is important to emphasize that this model is stable, as the roots of the characteristic polynomial are smaller than one in absolute value.

White test p-value: 0.3309

LM test p-values:

0.1810
0.0106
0.0347
0.0004
0.5142
0.1205
0.0964
0.1373

VAR Roots (modulus):

0.635959
0.635959
0.606150
0.606150
0.389583
0.389583

4. Social Protection specification – VAR 4

Fourth specification – "VAR 4": Social Protection, tax revenues and GDP deflated by the GDP deflator; 5 lags; control variables: Dum0809. The following table summarizes the estimated coefficients of this SVAR.

TABLE 6 - VAR 4 ESTIMATED COEFFICIENTS

	Social Protection	Revenue	GDP
Social Protec (0)			-0.004051*****
Social Protec (-1)	0.282296***	-0.000977	0.004013***
Social Protec (-2)	-0.270076***	0.010698	-0.003006*
Social Protec (-3)	0.068802	-0.044875***	0.003686*
Social Protec (-4)	-0.187817*	0.027097*	-0.004488***
Social Protec (-5)	-0.346061***	-0.015692	0.006462***
Revenue (0)			0.033337***

Revenue (-1)	1.994490**	-0.417196***	-0.024938*
Revenue (-2)	1.058500	-0.230281*	0.006631
Revenue (-3)	-0.256333	-0.319712**	0.014638
Revenue (-4)	-1.454742*	-0.277479**	0.041880***
Revenue (-5)	-1.194906*	-0.030909	-0.026173*
GDP (-1)	-1.329379	-0.352335	0.154890*
GDP (-2)	1.630939	0.214465	-0.226941***
GDP (-3)	3.241722	0.931867*	0.075054
GDP (-4)	-4.361128	0.339380	0.457323****
GDP (-5)	-4.874862	0.250770	0.042820
C	-0.004061	0.016388	0.006219****
Dum0809	0.026590	-0.013433	-0.013672****

(0) It refers to the SVAR's contemporaneous response of GDP to social benefits and to revenues (if negative, the impact is positive due to matrix algebra).

Finally, the analysis of the residuals of this specification are presented in outputs below, with the results for the White, LM (autocorrelation) and VAR stability tests. Note that we do not reject the null hypothesis of the White's test, which indicates that the residuals do not show heteroscedasticity. Also, the LM test indicates that there are no autocorrelation problems in this SVAR model. Finally, it is important to emphasize that this model is stable, as the roots of the characteristic polynomial are smaller than one in absolute value.

White test p-value: 0.1702

LM Test p-values:

0.1656
0.7531
0.9612
0.7299
0.9335
0.3046
0.5566
0.8362

VAR Roots (modulus):

0.899447
0.899447
0.883571
0.883571
0.824776
0.817170
0.817170
0.795288
0.795288
0.691619
0.613499
0.613499
0.601719
0.601719
0.363052
0.719031
0.692802
0.543826

APPENDIX B – Revenue shocks analysis

In this appendix, we present the results of the impulse response functions of tax revenue shocks on Pakistani output for each SVAR specification analyzed in this report, also indicating the associated multipliers estimated from the models.

1. Pensions and Allowance specification – VAR 1

The response of GDP to a shock in Revenue is positive, but it is not significant in most quarters, as shown in Figure 7.

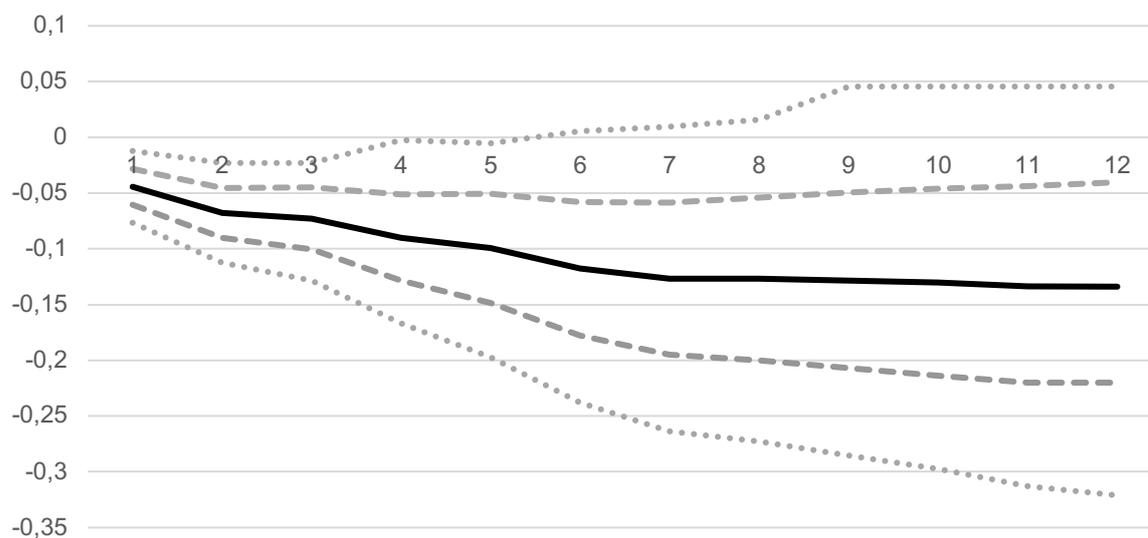Figure 7 - Accumulated response of GDP to a shock in Revenue
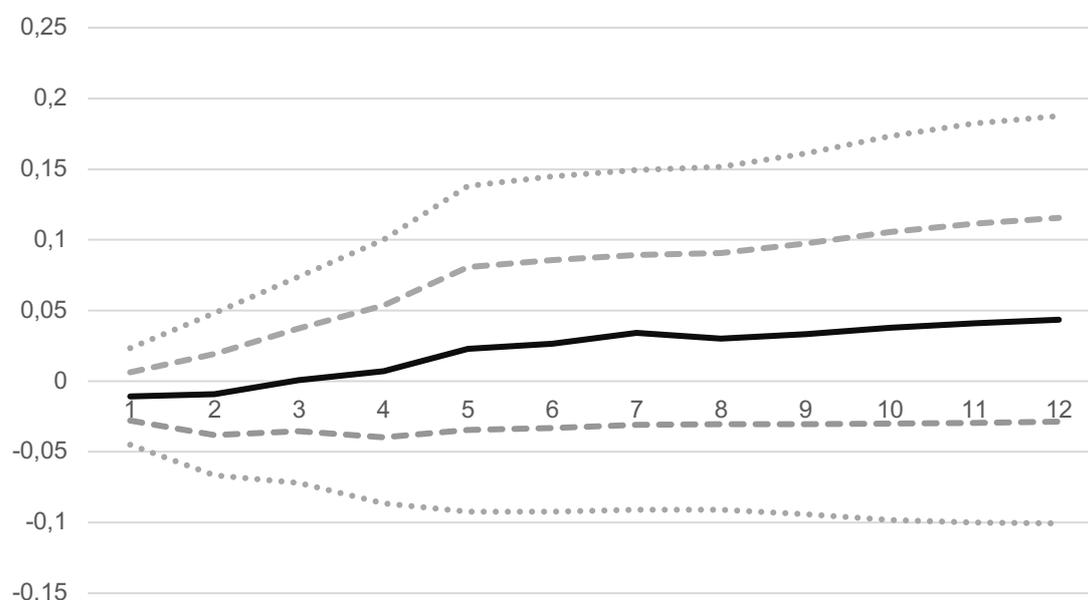
Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in revenue.

The estimated multipliers associated with such output responses can be summarized as follows: **-0.1 (impact), 0.37 (peak, quarter five), 0.43 (accumulated in twelve quarters).**

2. Public Social Investment specification – VAR 2

The negative response of GDP to a shock in Revenue is significant at 68% in most quarters, as shown in Figure 8.

Figure 8 - Accumulated response of GDP to a shock in Revenue
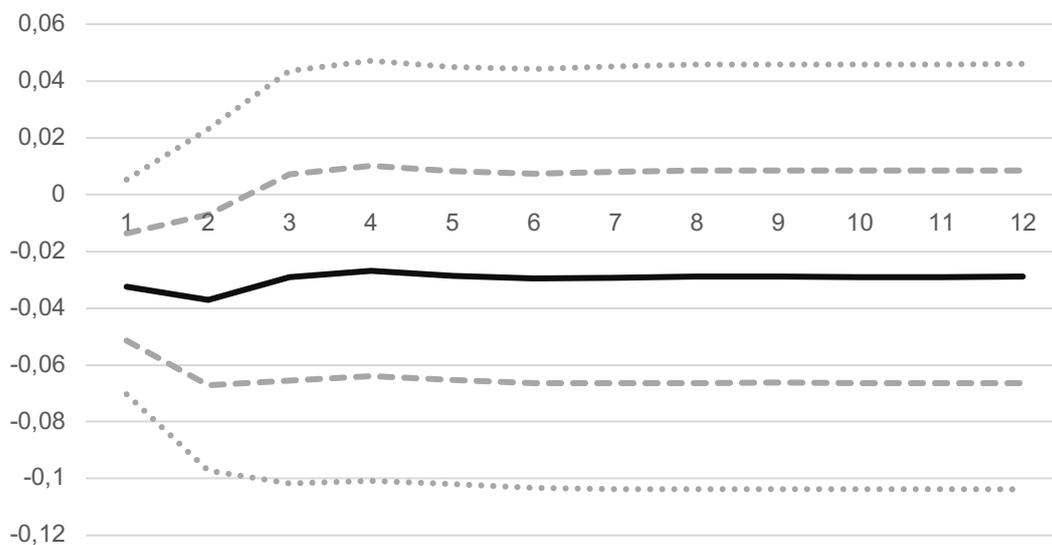

Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in revenue.

The estimated multipliers are the following: **-0.4 (impact); -0.4 (peak, first quarter); -0.9 (accumulated, after twelve quarters).**

3. Social Security and Welfare specification – VAR 3

Figure 9 shows the response of GDP to a shock in revenue (it is not significant at 68%, except the first quarter).

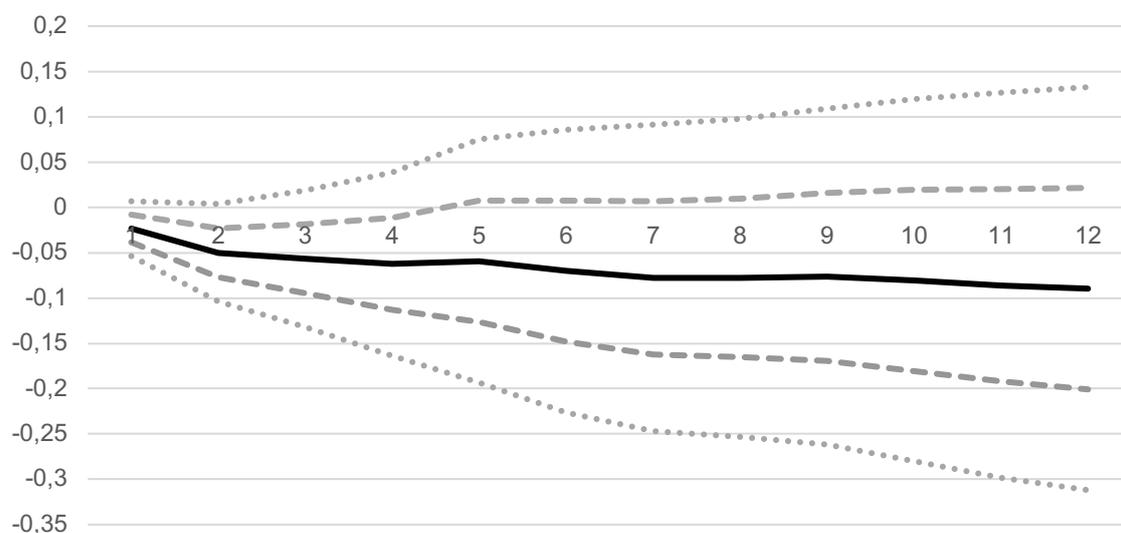Figure 9 - Accumulated response of GDP to a shock in Revenue

Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in revenue.

The estimated multipliers associated with such output responses can be summarized as follows: **-0.2 (impact); -0.06 (peak, third quarter); -0.25 (accumulated after eight quarters).**

4. Social Protection specification – VAR 4

The response of GDP to a shock in Revenue is not significant in most quarters, as shown in Figure 10.

Figure 10 - Accumulated response of GDP to a shock in Revenue

Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in revenue.

Estimated multipliers effects for Revenue: -0.2 (impact); -0.01 (peak, quarter five); -0.7 (accumulated after twelve quarters).

5. Summary of results

The results of this empirical experiment are summarized in Table 7, highlighting the estimated multipliers for each of the specifications. It is noteworthy that, with regard to the impulse response functions of the output to collection shocks, all specifications did not present statistical significance at the 5% significance level in practically any period of analysis. Moreover, many of the answers were not significant even considering a one standard deviation confidence interval.

TABLE 7 - REVENUE MULTIPLIERS FOR EACH SPECIFICATION

Model / Multiplier type	Impact Multiplier	Peak Multiplier (in period "t")	Accumulated Multiplier (twelve or ten quarters)
VAR 1	-0.1	0.37 (t=5)	0.43
VAR 2	-0.4	-0.4 (t=1)	-0.9
VAR 3	-0.2	-0.06 (t=3)	-0.25
VAR 4	-0.2	-0.01 (t=5)	-0.7