Government aid, financial soundness and going digital: the case of Armenian SMEs during COVID-19*

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Abstract

This paper examines the role of digitalization and government aid in supporting SMEs to maintain their financial soundness during the COVID-19 pandemic. The data was obtained through an electronic survey conducted with 452 Armenian SMEs which included 452 valid responses that were further analyzed by using IBM SPSS Statistics software. In order to test our hypotheses, a linear regression was run between different components of the financial burden and the possibility of converting a business model into an e-business model. Binary logistic regression models were run between the variables asking about government support and using measures that ease financial burden of companies as well as government support in firm's ability to undertake digital adoption. Our results highlighted the effectiveness of digitalization and government aid in supporting the SMEs to maintain their financial soundness during the crisis. Nevertheless, we found that the government support did not enhance the likelihood of digital transformation by SMEs. This study demonstrates that while digitalization and government aid are effective in maintaining the financial soundness of SMEs, the policy measures in place do not contribute to a wider digital adoption among SMEs. The latter is explained by the fact that the existing business support measures were not targeted towards digitalization and those that were in place were not effective enough.

Keywords: SMEs, digitalization, government support, financial soundness
JEL Codes: M15, H12, O38

1. Introduction

Small and medium-sized enterprises (SMEs) are essential drivers of growth and development in both developed and developing economies. Despite differences in conceptualization, these businesses represent over 95 % of all businesses globally, generating around half of the private-sector employment and value added (European Commission 2019; OECD 2019; World Bank 2020).

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The COVID-19 pandemic revealed the vulnerability of SMEs to external crises. Although both large companies and SMEs have been affected, several studies and reviews (Balla-Elliott/Cullen/Glaeser/Luca/Stanton 2020; Bartik/Bertrand/Cullen/Glaeser/Luca/Stanton 2020; Dua/Ellingrud/Mahajan/Silberg 2020; Lindsay/Neha/Mahajan/Maxwell/Pandher 2020; OECD 2020) emphasize that the effects of the crisis were larger on SMEs. This can be explained by certain specificities of SMEs such as their heavier reliance on the velocity of money which led to the decrease in cash inflow due the sudden fall in regular trade demand, as well as the lack of readiness, excessive reliance on local and government agencies, and a more significant psychological and financial impact on owners and managers (Hossain/Akhter/Sultana 2022).

To mitigate the negative impact of the COVID-19 pandemic on the economy, governments have implemented a variety of policies, including fiscal, monetary, and financial policy measures (Brodeur/Gray/Islam/Bhuiyan 2020), with majority of these measures targeted at the most vulnerable players of the economy – the SMEs (Cassim/Hanjiski/Schubert/Zouaoui 2020). Digitalization was seen as another tool to deal with the repercussions of the crisis (Papadopoulos/Baltas/Balta 2020; Guo/Yang/Huang/Guo 2020). Businesses were increasingly digitizing operations to adapt to changing circumstances; nonetheless temporary closures, employment and wage reductions, and bankruptcies took place (OECD 2020). The obstacles met by SMEs on the path to digital adoption during the pandemic have reinforced the need for and importance of sound government measures that would create a favourable environment for digital transformation (OECD 2020; World Economic Forum 2021).

The objective of this paper is to study the role of digitalization and government support in helping SMEs in Armenia to cope with the challenges caused by the pandemic, in particular maintaining their financial soundness. In order to answer these questions, an electronic survey was conducted among SMEs operating in the Republic of Armenia.

The results of our analysis showed that the capacity to undertake digital transformation has decreased the likelihood of taking measures to ease the financial burden such as annulment of employee contracts, reduction of staff working hours and salaries, temporary suspension of salary rises and/or bonuses, and adoption of new short-term borrowings. Furthermore, digitalization helped companies in meeting their financial obligations associated with rental costs and cancellation of investments. Our findings also stressed the importance of government aid by showing that SMEs which received government support had a higher likelihood of meeting their financial obligations towards their financial providers and tax authorities. Interestingly though, we found that government support did not contribute to higher digitalization by SMEs. This could be explained by several factors. First, the business support programs implemented by the Government

of Armenia were mostly in the form of financial assistance including subsidies, loans and grants and were not targeted towards higher digital adoption among SMEs (see Appendix 1). Second, the implemented programs aimed at digitalization were not effective enough as they were referred to as chaotic by the representatives of Armenian enterprises (Uvarova 2021). Finally, the government support in the form of financial assistance could have decreased the motivation and necessity for SMEs to undertake digital transformation, as the received aid could be a substitute to digitalization as a means to respond to the challenges of the crisis.

This study contributes to the growing literature on the role of government policies and digitalization in alleviating the hardships of the crisis for SMEs. While the role of government support and digitalization in dealing with the challenges of the pandemic is studied widely and is hard to overestimate, the effectiveness of these policies and tools still remains an open question. Presenting a case study from an emerging economy like Armenia, this paper demonstrates that while digitalization and government aid are effective in maintaining the financial soundness of SMEs, the policy measures in place do not contribute to a wider digital adoption among SMEs.

The paper is structured as follows. Section 2 provides a literature review on SMEs' role in the economy of Armenia, its peculiarities and the impact of COVID-19 on them, the role of digitalization as a crisis management tool, as well as the role of government support to maintain financial soundness of SMEs and to undertake digital adoption. Based on that evidence, three hypotheses are advanced. Section 3 describes research design and methodology. Section 4 is devoted to the results of the analysis, and section 5 offers discussion of the main findings. Finally, section 6 concludes the paper.

2. Literature review and hypothesis development

2.1. SME performance during crisis

SMEs are an important source of innovation and entrepreneurial activity. As noted by Sahut and Peris-Ortiz (2014:663), these businesses *"provide the most conducive environment for entrepreneurship and innovation that are not necessarily sustained by the know-how and resources characteristic of large-scale production but require commitment and close cooperation between company members"*. They play a significant role in driving growth, creating jobs and opening new markets for sustainable development through domestic trade liberalization (Pu/Qamruzzaman/ Mehta/Naqvi/Karim 2021).

Being widely referred to as the backbone of the world economy, SMEs are essential players in the economy of Armenia as well. According to national statistical data, there are around 68,000 small and medium-sized enterprises in

Armenia (Statistical Committee of Armenia 2019). SMEs account for over 99 % of all businesses in the country and are represented in all sectors of the economy, with a significant share in wholesale and retail trade (64 % of all businesses). SMEs provide more than two-thirds (68 %) of wage employment and contribute almost a quarter (24 %) to GDP *(Ibid.)*.

The recent edition of the OECD *SME Policy Index* (OECD 2020) reveals that the institutional and regulatory framework for SME policy has improved in Armenia over the past years. Specifically, the country "has broadened the scope of support it provides to SMEs through a dedicated SME agency, advanced in the development of the new SME strategy, and revised its e-procurement system to enable greater SME participation" (OECD 2020:315). On most dimensions of the index (responsive government, entrepreneurial human capital, access to finance, access to markets, and innovation and business support), Armenia is comparable with the Eastern Partner countries (Azerbaijan, Belarus, Georgia, Moldova, and Ukraine) and has made progress in implementing the Small Business Act for Europe *(Ibid.*). As stated in the *Small and Medium Entrepreneurship Development Strategy 2020–2024* (discussed in October 2019), the Government aims to facilitate entrepreneurship in Armenia, support the increase in productivity among SMEs, their competitiveness in local and international markets, as well as the introduction of productive technologies and innovative ideas (Government of Armenia 2019).

SMEs are often characterized by informality, flat (horizontal), as opposed to hierarchical internal structures, and open and fluid communications between the owners and employees (Rothwell/Dodgson 1991). Small businesses face a range of size-related challenges in attracting and retaining qualified workforce and accessing finance (Beck/Demirguc-Kunt 2006; Harvie/ Narjoko/Oum, 2013; Dundon/ Wilkinson 2018). National and cross-country data also suggest that as compared with large companies, SMEs have lower productivity and wage levels (OECD 2019; Albaz/Dondi/Rida/Schubert 2020a). Flexibility and adaptability to changing circumstances, as well as creativity and innovativeness – also under major economic crises – are among their defining features (Antony/Kumar/Mad 2005; Smallbone/Deakins/Battisti/Kitching 2012).

Nevertheless, the COVID-19 pandemic revealed the vulnerability of SMEs to external crises. Many scholars have stated that SMEs were hit harder by the COVID-19 crisis than the large companies (Balla-Elliott et al. 2020; Bartik et al. 2020; Dua et al. 2020; Lindsay et al. 2020; OECD 2020).

The SMEs in Armenia struggled to maintain their operations due to the supply shortages and the decrease in domestic demand. According to the survey conducted by UNECE, only 20 % of SMEs were able to achieve the pre-pandemic levels of earnings by July 2020. For the rest, the earnings declined by up to 50 % (UNECE 2020). Bartik et al. (2020) explored the impact of COVID-19 on

small business outcomes and expectations through analysis of a survey dataset of more than 5,800 small businesses in the United States between late March and early April 2020. Their findings suggest that due to financial fragility, small businesses have massively laid off workers and closed production and sales sites. An analysis of the impact of the pandemic on small businesses in the United States using representative data from the April 2020 *Current Population Survey* suggested that minority-immigrants (African American, Latin-American, and other), as well as female-owned small enterprises have been affected disproportionately (Fairlie 2020).

One of the reasons why SMEs are more vulnerable to the crisis, as identified in the literature, are the following: *first,* these businesses are overrepresented in sectors which were the most affected by containment measures, *e.g.,* tourism, retail trade, and transportation; *second,* as compared with large companies, SMEs, in general, have less cash in reserve, and thus, are more affected by human resource and capital underutilization; *third,* SMEs are more dependent on global and national supply chains, which were disrupted by the crisis (Albaz/Mansour/Rida/Schubert 2020b; Bartik et al. 2020; Dua et al. 2020; OECD 2020; Turner/Akinremi 2020).

The COVID-19 pandemic is strongly affecting profitability and long-term viability of SMEs and is opening up a new channel for analyzing SMEs' adaptability and performance (Emejulu/Agbasi/Nosike 2020, Hadi/Supardi 2020), reduction of financial constraints (Nyanga/Zirima 2020) and augmenting productivity (McGeever/McQuinn/Myers 2020). Several studies have emphasized the role of technology integration, effective financial intermediation, and government incentives as essential tools in improving their chances of survival during pandemics (Ratnasingam/Khoo/Jegathesan/Wei/Abd Latib/Thanasegaran/Liat/Yi/Othman/Amir 2020; Liguori/Pittz 2020; Fitriasar 2020).

2.2. Digitalization and financial soundness

Since digitalization is a complex phenomenon, there is no universally accepted definition of it. While talking about digitalization, academic literature distinguishes three interrelated yet distinct concepts: digitization, digitalization, and digital transformation. Digitization is defined as the process of turning physical information into digital formats for processing, storage, and transmission by computers (Dougherty/Dunne 2012; Loebbecke/Picot 2015). Digitalization depicts how the use of information and communications technology alters an organization's business model, including creating new or improved ways of delivering services, communicating, and improving the quality of offerings (Ramaswamy/Ozcan 2016). The latest phase is known as digital transformation which implies emergence of entirely new business models based on radically novel logics to create and capture value (Kane/Palmer/Phillips/

Kiron/Buckley 2015; Parker/Van Alstyne/Jiang 2016; Iansiti/Lakhani 2017; Verhoef/Broekhuizen/Bart/Bhattacharya/Dong/Fabian/ Haenlein 2021). For the purposes of this paper, we use the broader term digitalization to capture all forms of digital transformation.

Extant literature highlights the benefits of digitalization when being adopted by organizations such as enhanced competitiveness, productivity, and performance (Bruque/Moyano 2007; Dibrell/Davis/Craig 2008; Kleis/Chwelos/Ramirez/Cockburn 2011; Chan/Teoh/Yeow/Pan 2018). Digitalization enables organizations to reinvent their products and enter new markets, to work with a wider range of suppliers and customers and significantly lower the transaction and coordination costs (Lanzolla/Lorenz/Miron-Spektor/Schilling/Solinas/Tucci 2020). A growing number of researchers have advocated the positive linkage between digitalization and sustainability, arguing that operational efficiency enables SMEs to harness the benefits of competitive markets, thus accelerating their path to sustainability (Manyati/Mutsau 2019; Saidu/Aifuwa 2020; Das/Kundu/Bhattacharya 2020). The literature has also investigated the role of financial innovation in SMEs sustainability. Several researchers have attested that the use of innovative financial services reduces redistribution effects and financial execution while enabling a higher degree of financial efficiency (McGuinness/Hogan/Powell 2018; Mocking/Möhlmann/Palali 2016).

Considering the pivotal role of IT in today's businesses, research shows (Beckman/Eisenhardt/Kotha/Meyer/Rajagopalan. 2012; Al Omoush 2020) that effective strategies for long-term sustainability should integrate e-business solutions. The leading role of IT is not merely that of a reactive enabler; it should also have a proactive function in modern business (Nissen/von Rennenkampff 2017). Scholars (Beckman et al. 2012; Al Omoush/Al-Qirem/Al Hawatmah 2018) underline that a corporate entrepreneurial orientation includes a willingness to be proactive in the adoption of e-business solutions rather than reactive to rivals' actions. E-business proactiveness capability is captured as an organization's ability to enrich its technological innovativeness, seizing new business opportunities by adopting and using novel e-business solutions (Hull/Caisy Hung/Hair/Perotti/DeMartino 2007).

In this technological era, digitalization is seen as an important tool to deal with repercussions of crises (Papadopoulos et al. 2020). Hence, it is of no surprise that COVID-19 has intensified the need for digitalization and accelerated the process of adoption of digital tools for SMEs (OECD 2021). The results of a survey conducted by McKinsey have shown that companies have expedited the digitization of their customer and supply-chain interactions and of their internal operations by three to four years and the share of digital or digitally enabled products in their portfolios has accelerated by a shocking seven years (LaBerge/O'Toole/Schneider/Smaje 2020). Through a systematic literature re-

view, Ambrosio-Pérez et al. (2023) study the impact of the COVID-19 pandemic on the use, growth, and development of e-business. Their findings indicate that e-business tools allowed many businesses to continue subsisting and making sales thanks to the increase in online users due to the COVID-19 lockdowns. In particular, the pandemic changed the traditional processes related to the management of businesses and companies inducing a transition from a traditional business model to e-business model, where e-commerce was the most practiced method used by entrepreneurs.

In an empirical study Guo et al. (2020) demonstrated that digitalization can help SMEs to respond strategically to public crises and contribute to the improvement in SMEs' performance. Drawing on the dynamic capabilities' perspective, the authors state that highly digitalized firms can leverage their dynamic capabilities to sense a crisis, seize opportunities during the crisis, and reconfigure resources to cope with the crisis, thus increasing the firm's ability to respond to crises quickly and effectively. To mitigate the consequences of the pandemic, SMEs use a variety of digital technologies such as mobile and collaborative technologies and the Internet of things with next-generation telecommunication networks (e.g., 5 G), big data analytics, artificial intelligence (AI) that uses deep learning, and blockchain technology (Papadopoulos et al. 2020).

By enabling remote working practices and shift to e-commerce, digitalization helps companies to secure business continuity during the pandemic (OECD 2021) and therefore maintain financial soundness. Nevertheless, the peculiarities of SMEs, such as scarcity of cash reserves, lack of access to finance and limited managerial capital resources (Thrassou/Vrontis/Bresciani 2018a), make it harder for them to digitalize, hence leading to temporary closures, employment and wage reductions, and bankruptcies (OECD 2021). In fact, according to the results of the UNECE survey, only 19 % of SMEs in Armenia mentioned e-commerce as a coping strategy against COVID-19 crisis (UNECE 2020) the rationale being Armenians' limited use of the internet for economic activities (Raja/Mamulyan 2020).

Based on the reviewed literature we hypothesize that:

Hypothesis 1a: The SMEs that undertook digital transformation were less likely to apply measures that ease financial burden.

Hypothesis 1b: The SMEs that undertook digital transformation were more likely to meet financial obligations.

Hypothesis 1c: The SMEs that undertook digital transformation were less likely to cancel any planned investments.

2.3. Government support and financial soundness

To address the negative impact of the COVID-19 pandemic on economic activity, most governments have implemented policy measures assuming fiscal and monetary stimuli, financial regulation, industry support, and trade interventions (Baldwin/Weder di Mauro 2020b). The variety of policies implemented by governments across countries were targeted at households, firms, health systems and banks (Brodeur et al. 2020).

Given the lockdown policies, unemployment benefits and public spending are more effective as fiscal policy tools during the pandemic vis-a-vis the usual times. However, to offset the effects of the pandemic, the required spending would be excessively large (Auray/Eyquem 2020). Research suggests that in addition to providing to those in need and maintaining the availability of basic necessities in the times of the pandemic, the government should concentrate on a core objective, – preventing excessive economic disruption (Dell'Ariccia/Mauro/Spilimbergo/Zettelmeyer 2020). To achieve that goal governments are supposed to relax their rules and provide ample subsidies, loans, tax breaks, and even nationalize distressed private entities. Other researchers have asserted that SMEs are the most vulnerable during the COVID-19 pandemic as movement and gathering limitations deprive them from the usual sources of finances. Therefore, it is suggested that governments design strategic policies of interventions assisting these firms (Brown/Rocha/Cowling 2020).

According to Cassim et al. (2020) the government support during the COVID-19 crisis was unprecedented. Just in the first few months, governments announced about $10 trillion of relief, (three times more that of 2008–2009 financial crisis), with 90 % of countries implementing measures that were focused on SMEs (Cassim et al. 2020). The OECD summary of over 40 SME surveys worldwide (OECD 2020) reveals that most SMEs had revenue loss and expected to be out of business unless public assistance was available and extended over the duration of the crisis. A McKinsey analysis of several small business surveys in the United States (Dua et al. 2020) suggested that unless sufficient government support was provided, 1.4 – 2.1 million (25–36 %) small businesses "could close permanently as a result of the disruption from just the first four months of the COVID-19 pandemic".

Demmou et al. (2021) have cautioned against the potential debt overhang that policies aimed at mitigating the impact of the COVID-19 pandemic may cause, hinting at delayed post-Covid recovery. Furthermore, as Gourinchas et al. (2021) summarize the literature, there is a consensus that so called '2021 SME time bomb' is hanging over the post-COVID recovery for three main reasons: (a) the policies were too generous during 2020 and often let afloat enterprises that in normal times would have closed down, (b) much of the support has been in a form of subsidized loans and thus a large insolvency problem is potentially

expected, and (c) the end of the support programs will leave the fragile firms facing large liquidity problems. However, the authors suggest a more optimistic view by demonstrating through an empirical analysis that these policies have saved many companies and at worst delayed the demise of some. Moreover, Demmou et al. (2021) also claim that the credit problem of 2021/22 will not be costly for the governments to handle.

To handhold the SMEs and ease the pressures of survival due to COVID-19 the Government of Armenia elaborated and implemented twenty-five programs to address the impact of COVID-19 pandemic, including twelve addressed to businesses (see Appendix 1). Four programs were designed specifically for SMEs, including lending through the Investment Support Center of the Ministry of Economy Action No 3, and one-time grants for effective job support, implemented through the State Revenue Committee Actions No 5, 18 and 21. Another six business support actions included loan guarantees and subsidies to all enterprises with fair tax and credit history, irrespective of their size; support to agriculture, micro-enterprises, high-tech companies, startups, and tourism and viticulture businesses (see Appendix 1).

Augmenting Government aid with international assistance SMEs could benefit from EU actions to address the crisis and develop sustainable economies. Those included the COSME programme *(Programme for Competitiveness of Enterprises and SMEs),* rendering aid to SMEs and business support organization; the EU-GAIA initiative *(EU Green Agriculture Initiative in Armenia)* supporting the northern provinces of Armenia by providing agricultural inputs, equipment, infrastructure and services, and Innovative Tourism and Technology Development for Armenia project, with its main goal "to ensure overall and balanced development in tourism and innovation".

The results of the UNECE survey demonstrated that the Armenian SMEs found it hard to survive, with only 21 % stating they could maintain operations without the support from the government, while the remaining 79 % emphasized the role of government support, in particular tax deferrals and subsidized loans, for maintaining operations (UNECE 2020).

In an empirical study Chen et al. (2020) found that while policies including payment deferrals and exemptions were effective in improving SMEs' cash flows and further stimulating their operational recovery, financial support policies did not appear to be effective in alleviating SMEs' cash constraints or encouraging the reopening of small businesses, potentially due to difficulties in accessing policy-oriented loans and misallocation of credit.

Hence, we advance the following hypothesis:

Hypothesis 2a: The SMEs that received government support were less likely to apply measures that ease financial burden.

Hypothesis 2b: The SMEs that received government support were more likely to meet financial obligations.

Hypothesis 2c: The SMEs that received government support were less likely to cancel any planned investments.

2.4. Government support and digitalization

The technology-organization-environment framework states that the interaction with the government is one of the aspects that may influence organizational usage of IT innovation (Lin 2014). Many governments put digital transformation at the center of their policy agendas paying growing attention to emerging digital technologies such as AI, blockchain and 5G infrastructure. In Armenia, the Digital Transformation Agenda 2018–2030 introduced by the government has put digital technologies at the heart of its economy. It has six priority areas to enhance Armenia's international competitiveness through digital transformation: smart government; creative digital workforce; highly efficient, reliable and affordable infrastructure; safe and resilient cyberspace; an internationally competitive private sector; interconnected, collaborative and functional institutional structure. In 2019 the National Venture Fund was launched – a public-private partnership with the aim of investing $100 million over 5–7 years. Finally, significant investments have been made in education, in particular through the Model for Creative Education in New Technologies (TUMO) which offers free programming lessons to nearly 7,000 Armenians aged 12 to 18 (Uvarova 2021).

The COVID-19 crisis accelerated the need for digitalization, as a crisis response and means for recovery, and reinforced the need for a coordinated government policy towards digital transformation (OECD 2020). Despite the grown interest in digital adoption spurred by COVID-19, SMEs faced certain barriers to digitalization such as financial constraints, lack of skilled labor and infrastructure limitations. This pinpoints the important role that policymakers in emerging countries have to play to create a conducive environment for wider adoption and deeper integration of digital technology among SMEs (World Economic Forum 2021).

Exploring the role of government in digital transformation for SMEs, Chen et al. (2021) identify 4 main roles that they could undertake. The first is building a digital platform, second is the promotion of mobile/digital payments, third is the provision of digital training, and finally the fourth one is building a digital collaboration ecosystem.

Digital technologies have played a vital role in reducing negative outcomes and for tackling the crisis situations more effectively. Katz et al. (2020) used evidence from the SARS outbreak to examine the impact of digitalization on the economic resilience of countries during the crisis. The findings indicate

that countries with better broadband connectivity managed the negative economic impacts of SARS outbreak better. Government responses to the pandemic in emerging economies that have introduced digitalization support through resources and tailored policy measures have helped businesses be more resilient and reduce the adverse effect on firm economic performance. The government of Costa Rica established a platform for businesses without an online presence, as well as a smartphone app and texting service to facilitate trade among producers of agricultural, meat and fish products. Senegal ran an awareness campaign on the benefits of e-commerce, while Indonesia launched a capacity-building programme to accelerate digitalization among MSMEs (UNCTAD 2021). Andargoli et. al. (2022), using COVID-19 surveys conducted by the World Bank (2021a) for three countries, El Salvador, Greece, and Italy, found that governmental support of adoption of digital technologies since the COVID-19 outbreak raised the probability of a firm's innovation.

With the aim to support SMEs in their efforts to cope with the impact of the COVID-19 pandemic in Armenia a series of training sessions were organized entitled "Developing Entrepreneurship Through Digitalisation" (Uvarova 2021).

Nonetheless, according to the results of the interviews and online survey conducted by the Eastern Partnership Civil Society Forum (EaP CSF) state decisions in times of COVID-19 are perceived as chaotic and difficult to predict in the EaP countries. Respondents from Armenia pointed out that the lack of a clear strategy and certainty in legal regulation to support digitalisation was a significant barrier to SME digitalization (Uvarova 2021). Hence, the effectiveness of government policies in relation to contribution to digital transformation among SMEs still remains to be analysed.

Therefore, we hypothesize that:

Hypothesis 3: The SMEs that received government support were more likely to undertake digital transformation compared to the companies which did not receive government support.

3. Research design and methodology

The survey used in this study was administered electronically by the Center for Business Research and Development (CBRD) at the American University of Armenia. The survey was conducted among small and medium Armenian companies, which received invitations for participation and links to the survey via email. In line with the EU definition, the SME definition in Armenia is based on three criteria covering employment, turnover and balance sheet. More specifically, micro enterprises are defined as enterprises that have less than 10 people and whose annual turnover or balance sheet does not exceed 100 million AMD (185,580 euro). Small enterprises are defined as enterprises that employ

less than 50 persons and whose annual turnover or annual balance sheet does not exceed 500 million AMD (927,900 euro). Finally, medium enterprises are defined as enterprises that have less than 250 employees and an annual turnover that does not exceed 1,500 million AMD (2,783,700 euro) or an annual balance sheet not exceeding 1,000 million AMD (2,041,380 euro) (OECD, 2020). In case if the survey link was not opened during the 12 and then 24 hours after the receiving the potential respondents received 2 reminders /1st reminder after 12 hours, 2nd reminder after 24 hours/. Those who did not open the link in 2 days got the 3rd reminder on the 3rd day. The data collection was done by two waves. The first wave involved 16,767 invitations to the companies with 3 iterations between 05.04.2021 and 08.04.2021. The total number of invitations was 52,169, with primary targeting of 44,713 SMEs that had both registered wage earners and positive income in 2020[1]. The survey was conducted from 28.03.2021 to 08.04.2021 resulting in 452 valid responses where most respondents (69 %) stated that they are the owners of the enterprise, which were further analyzed with SPSS Statistics 23.0 software to test the hypotheses stated in the preceding sections of this research.

To test the stated hypothesis and to measure the importance of digitalization for Armenian SMEs, the relationship between impact of digitization on Armenian SMEs and consequences of the recent COVID-19 pandemic was studied (see survey questions in Appendix 2). The questions for measuring innovation impact were based on OECD's OSLO Manual (2018) where the fourth version included a number of modifications to take into account a broader range of innovation-related phenomena as well as the experience gained from recent rounds of innovation surveys in OECD countries and partner economies and organizations.

4. Results

The collected data illustrates that 52 % of 402 companies reported that they have benefited from the government stimulus package (detailed in Appendix 1). Approximately one-third of the companies that benefited from the government aid reported that they initiated digital transformation. Overall, 31 % of survey participants went through digital transformation by introducing online services in their business model. It should be noted that many of the companies that benefited from the government aid and undertook digital transformation (approximately 65 %) have been already using online services in their business

1 According to the "SMALL AND MEDIUM ENTREPRENEURSHIP IN THE REPUBLIC OF ARMENIA" Report of the National Statistical Committee, in 2019 there were in total 75 180 companies in Armenia, of which 135 were large, 4 272 were small, 743 were medium sized. The greatest number of the enterprises were microenterprises 70 030, of which 31 547 with 0 wage-earners. For most practical purposes, we can consider the survey to be statistically representative.

before the Covid-19 crisis. On the other hand, a higher proportion of companies who have not been using online services benefited from the government aid compared to the companies which already had online services in their business model (68 % versus 33 % accordingly). According to the survey results, about 69 % of companies that benefited from the government aid and about 61 % of companies that did not benefit from the government aid have indicated that they would need additional financial support rather than logistical (4.3 % and 7.3 % respectively), human resources (3.3 % and 5.7 % respectively), production (7.2 % and 7.3 % respectively), other type of additional support (15.8 % and 19.2 % respectively) (see Table 1). An overwhelming majority of the companies reported that the government stimulus package to SMEs was not sufficient to overcome the COVID-19 crisis.

Table 1. Company actions during COVID-19 paired with government support programs

		Have you benefited from the government stimulus package? N=402	
	Response Options	**Yes**	**No**
Taking digital transformation	Yes	28.2 %	33.7 %
	No	71.8 %	66.3 %
Providing online services before the crisis	Yes	32.5 %	47.7 %
	No	67.5 %	52.3 %
Government stimulus package to SMEs being sufficient to overcome COVID-19 crisis	Yes	13.4 %	16.1 %
	No	86.6 %	83.9 %
What kind of additional support companies need to overcome COVID-19 crisis	Financial support	69.4 %	60.6 %
	Human Resources support	3.3 %	5.7 %
	Logistical support	4.3 %	7.3 %
	Production support	7.2 %	7.3 %
	Other	15.8 %	19.2 %

Going further, in order to test *the first hypothesis* of this study by observing the relationship between companies having capacity to undertake digital transformation and likeliness for taking measures for easing their financial burden, *linear regression* was run between different components of the financial burden (5-point Likert scale statements, 1-very low burden,...,5-very high burden) and possibility of converting a business model into an e-business model (see Table 2). The results show that companies with the capacity to convert their business to an e-business model indicated that they took measures to ease their financial burden to a lesser extent (annulment of employee contracts, reducing working hours, salary cut, low-interest bearing short-term borrowings) compared to companies that did not have the capacity to convert their business to an e-business

model. For companies with the capacity to convert their business model to an e-business model, the score indicating the extent of annulment of employee contracts on average is lower by 0.531 points compared to companies that do not possess such capacity at 5 % significance level. On average, the score representing reduced staff working hours is lower by 0.468 points for companies with the capacity to convert their business model to an e-business model compared to companies without such capacity at 5 % significance level. Similarly, on average, the scores indicating salary cuts, temporary suspension of salary rises and/or bonuses and low interest-bearing short-term borrowings are lower by 0.517, 0.94 and 0.622 points respectively for companies with the capacity to convert to an e-business model compared to those without such capacity. As presented in Table 2 not all categories of financial burden provided statistically significant relationships with the capacity to convert a business model to a e-business model; such factors are contracting new consultants, increasing staff workload, voluntary pay-cut, donations from staff, and requesting financial assistance from the government. In addition, the total score of financial burden has been calculated (5-point Likert scale statements: 1-very low burden,..., 5-very high burden) in order to measure the relationship between digital transformation and overall burden related financial obligations of the companies, however the results of model 11 in Table 2 indicate that this relationship is statistically significant only at 10 % significance level.

Table 2. Linear regression results: Inclination of companies to undertake digital transformation versus financial burden due to COVID-19 crisis

Dependent variables: Components of Financial Burden	Coefficients: Capacity to convert a business model to a e-business model
Model 1. Annulment of employee contracts	-0.531**
Model 2. Contracted new consultants	0.064
Model 3. Reduced staff working hours	-0.468**
Model 4. Salary cut	-0.517**
Model 5. Temporarily suspension of salary rises and/or bonuses	-0.94***
Model 6. Increase staff workload	-0.244
Model 7. Voluntary pay-cut	-0.268
Model 8. Donation from staff	-0.244
Model 9. Financial assistance from government	0.14
Model 10. Low interest-bearing short-term borrowings	-0.622**
Model 11. Overall Score: Financial burden	-0.226*

Significant at *** p<0.001, ** p<0.05, * p<0.1. Scale of dependent variables (column headings): 1-very low...5-very high. Independent variable has Yes/No response options, “No” is the base category.

The second part of the *first hypothesis* looks at the relationship between digital transformation and the ability of companies to meet their financial obligations and sustain their planned investments. Table 3 shows the results of logistic regression models for testing the aforementioned assumptions. The results partially support the stated hypothesis as the possibility to convert business into an e-business model statistically significantly increases the likelihood of companies to meet their rental obligations as well as not to cancel their planned investments compared to companies which do not have that capacity. Statistically significant relationship between digital transformation and continuity of business operations has been found only for *rental obligations* among all the obligations presented in Table 3. According to the Model 3 results (Table 3), the companies that have capacity to convert their business model into an e-business model were about *three times more likely* to continue their business operations in terms of *rental obligations* compared to the companies that do not have such capacity.

Table 3. Binary logistic regression results: Propensity of companies to undertake digital transformation versus their business operations continuity

	Dependent variables: Components of Meeting Financial Obligations							
Independent Variable	Model 1. Employees	Model 2. Suppliers	Model 3. Rental	Model 4. Taxes	Model 5. Financial providers	Model 6. Health insurance	Model 7. Local municipality	Model 8. Not canceling planned Investments
	Odds Ratio							
Capacity to convert a business model to a e-business model	1.515	1.430	3.058**	0.898	1.487	1.624	0.961	1.853**

Significant at *** p<0.001, ** p<0.05, * p<0.1. Scale of dependent variables for Models 1–6: 1-capable and 0-unable. Scale of dependent variables for model 7: 1-Ye, 0-No. Independent variable has Yes/No response options, "No" is the base category.

To test the *second hypothesis*, binary logistic regression models were run between the variables asking about government support and using measures that ease financial burden of companies, the results indicated no statistically significant relationship between these variables. Going forward, another group of logistic regression models (see Table 4) were run to test whether receiving government support increases the likelihood of meeting financial obligations and continuing with planned investments. As the results in Table 4 illustrate, companies that received government support had statistically significantly higher odds of meeting their obligations towards their financial providers (odds ratio is 2.157) and tax authorities (odds ratio is 2.192). However, regarding the remaining obligations and continuity of planned investments, the responses

of government aid recipients and not recipients did not vary statistically significantly.

Table 4. Binary logistic regression results: Government support versus business operations continuity

Independent Variable	Model 1. Employees	Model 2. Suppliers	Model 3. Rental	Model 4. Taxes	Model 5. Financial providers	Model 6. Health insurance	Model 7. Local municipality	Model 8. Not canceling planned Investments
	Odds Ratio							
Government aid (Yes)	1.435	0.993	0.757	2.192**	2.157**	0.73	1.865	0.891

Significant at *** p<0.001, ** p<0.05, * p<0.1. Scale of dependent variables for Models 1–6: 1-capable and 0-unable. Scale of dependent variables for model 7: 1-Ye, 0-No. Independent variable has Yes/No response options, "No" is the base category.

Figure 1 illustrates that a lower proportion of Armenian SMEs, which received government aid, reported being able to undertake digital transformation by having the capacity to convert their business to an e-business model. The results of logistic regression presented in Table 5 support this finding and the *third hypothesis* of this study should be rejected accordingly. According to the model results (Table 5), companies receiving government aid are about 0.521 times more likely to have the propensity to convert their business model to an e-business model compared to companies not receiving such aid.

Figure 1. Government aid versus capacity to be converted to e-business model

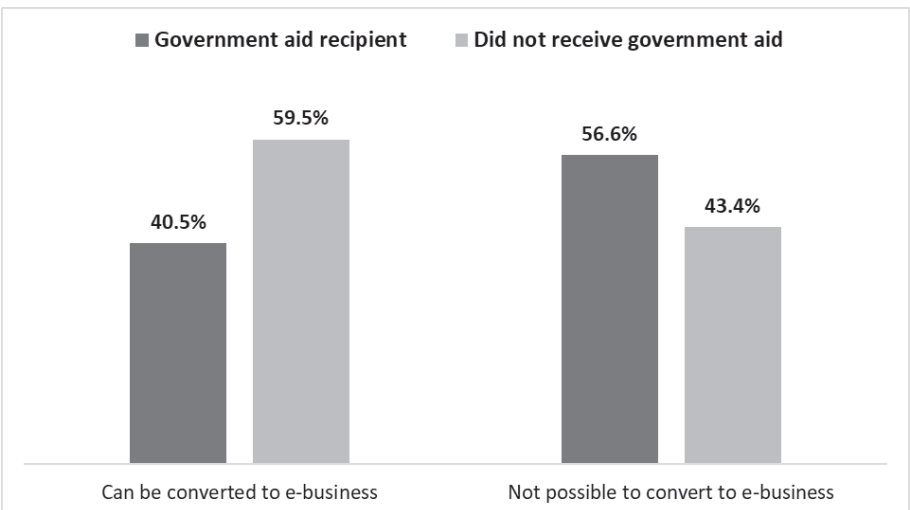

Table 5. Government support versus digital transformation

	Model 1: Propensity to convert a business model to a e-business model
Independent variable	**Odds Ratio**
Government aid (yes)	0.521**

Significant at *** p<0.001, ** p<0.05, * p<0.1. Scale of dependent variable: 1-Yes, 0-No.Independent variable has Yes/No response options, "No" is the base category.

5. Discussion and implications

According to the survey results, 87 % of the Armenian SMEs reported being negatively affected by the COVID-19 pandemic, and 50 % of them reported that the pandemic had a very high or somewhat high impact on their business operations. Based on this finding, it was very important to understand what the role of government support and digitalization was in overcoming the hardships caused by the COVID-19 pandemic. Overall, half of the companies reported that they received government aid, and one third of the survey respondents either undertook digital transformation or had the capacity to convert their business into an e-business model. According to the statistical models presented in the previous section, having the capacity to undertake digital transformation by converting their business into an e-business model decreases the financial burden of SMEs to some extent. In particular, on average companies that have ability to digitalize their business experienced approximately *0.5 points (out of 5) lower* financial burden associated with the a*nnulment of employee contracts, reducing staff working hours and salaries, 0.9 points (out of 5) lower* financial burden related to *temporary suspension of salary rises and/or bonuses*, and *0.6 points* (out of 5) *lower* financial burden associated with taking *new short-term borrowings* compared to the companies without the ability to digitize their business. Furthermore, the data analysis results indicate that companies with the ability to convert their business to digital have approximately *three times higher odds of meeting their financial obligations associated with rental costs* and *1.8 times higher chances of not cancelling their investments* compared to the companies with no capacity to digitalize their business. Interestingly, no statistically significant differences were found regarding applying for financial assistance from the government between companies with and without the ability to digitalize. All that said, we mainly were able to support the *first hypothesis* of this study.

With the second hypothesis, we tried to measure the role of government aid in lifting the financial burden of companies in Armenia during Covid-19 pandemic. Survey results showed that the measures which were applied by Armenian SMEs to ease their financial burden are not statistically significantly different

comparing companies as government-aid recipients and those that did not receive government stimulus packages. Further, government aid does not increase the likelihood of sustaining planned investments. On the other hand, companies that received government support have approximately *two times higher chances to meet their financial obligations towards their financial providers and tax authorities.* Therefore, the *second hypothesis* has been supported partially.

The third hypothesis explores the impact of government support on Armenian SMEs and whether that targeted support was utilized to undertake digital transformation. Digital transformation was measured by the possibility of converting a business to an e-business model. The model results showed that the companies which received government support have about 50 % lower chances of undertaking digital transformation in their companies compared to the companies that have not received support. Therefore, the *third hypothesis* of this study is not supported. A possible explanation of this finding can be that Armenian SMEs did not perceive government support as a long-term opportunity to change their business model to a digital one, but rather as a short-term means of overcoming their current financial obligations and hardships in business operations. Also 65 % of government aid recipients had already been using online services before the pandemic, so additional support may not have affected their business model.

This finding can be an important indication and recommendation to government agencies that support type should be vary by company profiles. This could be explained by several factors. First, the business support programs implemented by the Government of Armenia were mostly in the form of financial assistance including subsidies, loans and grants and were not targeted towards higher digital adoption among SMEs (see Appendix 1). Second, the implemented programs aimed at digitalization were not effective enough as they were referred to as chaotic by the representatives of Armenian enterprises (Uvarova 2021). Finally, the government support in the form of financial assistance could have decreased the motivation and necessity for SMEs to undertake digital transformation, as the received aid could be a substitute to digitalization as a means to respond to the challenges of the crisis.

6. Conclusion

Considering the major role that SMEs play in the economies of most of the countries, their financial soundness is of great importance for economic sustainability as a whole. Due to their vulnerability, the COVID-19 pandemic has posed a major challenge for SMEs to survive and succeed during the crisis. Hence, governments all around the world have come up with policy measures to ease the burden of SMEs and help them overcome the hardships of the crisis. Along with government support digitalization was seen as an effective measure to weather the storm of the COVID crisis.

In line with the existing literature, the results of our study have confirmed the effectiveness of digitalization and government aid in supporting the SMEs to maintain financial soundness during the crisis. Nonetheless, our findings suggested that government support did not contribute to the likelihood of digital transformation by SMEs. We explain these results by the fact that the existing business support measures were not targeted towards digitization and those that were in place were not effective enough.

Our study provides important practical implications. The results of our analysis stress that effective policy measures implemented by governments should not only constitute financial support in the form of tax breaks, subsidies, and loans, but also measures targeting the creation of a more conducive environment for digital transformation such as infrastructure development and workforce training. This would help SMEs to not only fight the consequences of the current crisis but to improve their performance and build resilience to future crises. For the managerial implications, we contend that SME owners need to pay attention to investing in their digital transformation, focusing on the long-term benefits. Moreover, we encourage SMEs to actively participate in policy-making processes where appropriate e-business support mechanisms are pivoted focusing on greater digital adoption leading to business growth. When choosing tailored strategies for accelerating digitalization pathways, successful outcomes can be articulated with the broader engagement of SME community and government stakeholders for multiplication effect. In building a digital ecosystem the successful pilots can provide greater focus for the policymakers to invest in firm-level capabilities including supporting systems, structures, and people leading to enhanced digital adoption.

This study has the following limitations. First, our paper focused on studying the innovation under uncertainty for SMEs in a single country context of Armenia. Second, we used the data from the survey that was conducted in 2020; hence, our findings represent the situation at the outbreak of the COVID-19 pandemic. Finally, a more nuanced look that considers the heterogeneity of SMEs such as the industry and firm size (micro, small, and medium) may have enhanced our understanding of whether those factors might make a difference in terms of the impact of digital transformation and government aid on financial soundness of the firms.

As an avenue of future research, we propose to study the relationship between government support, digitalization and financial soundness in the aftermath of the crisis. In particular, it would be useful to examine what kind of measures were introduced by policymakers to support the digital transformation of local firms and how effective they were in fighting the consequences of the crisis and building up the necessary competencies and resilience to stand up to future shocks.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix 1. Business support programs implemented by the Government of Armenia /March-December 2020

Action №	Overview	Status (duration)
1	Co-financing, re-financing, and subsidizing the loans of private commercial companies and individual entrepreneurs	*Ongoing* (adopted on March 29, 2020)
2	Full subsidization of agricultural loans and leasing	*Ongoing* (adopted on March 29, 2020)
3	Lending to affected sectors in amount of up to 50 million AMD to SMEs meeting the eligibility requirements (depending on the turnover)	*Completed* (March 29- June 30, 2020)

5	One-time grant for job retention, in amount of the salary of every 5th employee, provided to companies with up to 50 employees	*Completed* (March 29 – May 12, 2020)
10	One-time grants to micro enterprises (up to 136,000 AMD)	*Completed* (April 12 – May 20, 2020)
17	One-time grants to IT companies	*Completed* (April 14 – December 1, 2020)
18	One-time grants for active job retention, in amount of the salary of every 5th employee, provided to companies with up to 100 employees	*Completed* (May 12 – June 11, 2020)
19	Financial assistance to entrepreneurs and companies with innovative ideas (fully subsidized loans and grants)	*Completed* (June 4 – December 1, 2020)
21	One-time grant for job retention, in amount of the salary of every 5th employee, provided to companies with up to 100 employees	*Completed (*June 15 – August 3, 2020)
23	Assistance to tourism, accommodation and public catering businesses that are not micro enterprises /granting monthly assistance/	*Ongoing* (adopted on August 13, 2020)
24	Assistance to viticulture businesses /subsidizing the loan interests for purchasing raw, and state aid for leasing equipment/	*Ongoing* (adopted on August 13, 2020)
25	Assistance to tourism related businesses /reimbursement of 75 percent of unpaid interest starting from April 1, 2020/	*Ongoing* (adopted on September 12, 2020)

Source: Government of Armenia (2021), Ministry of Economy of Armenia (2021) and Government Decrees on approving the programs to address the economic impact of Covid-19 (see Government of Armenia, 2020 a-k).

Appendix 2. Survey questions

C5. Is it possible to convert your business model to an e-business model?

B2.7. To what extent has your company applied each of these measures to ease the financial burden during this crisis?

a) Annulment of employee contracts
b) Contracted new consultants
c) Reduced staff working hours
d) Salary cut
e) Temporarily suspension of salary rises and/or bonuses
f) Increase staff workload
g) Voluntary pay-cut
h) Donation from staff
i) financial assistance from government
j) Low interest bearing short-term borrowings
k) Other, please specify.

B2.8. How well do you meet your financial obligations for each of the following categories during the lockdown?

1. Employees
2. Suppliers
3. Rental
4. Taxes (VAT, corporate tax, etc.)
5. Financial providers (creditors)

6. Health insurance
7. Local municipality

B2.11. Did you cancel any planned investments in your company's infrastructure or production due to COVID-19?

D1. Have you benefited from the government stimulus package?