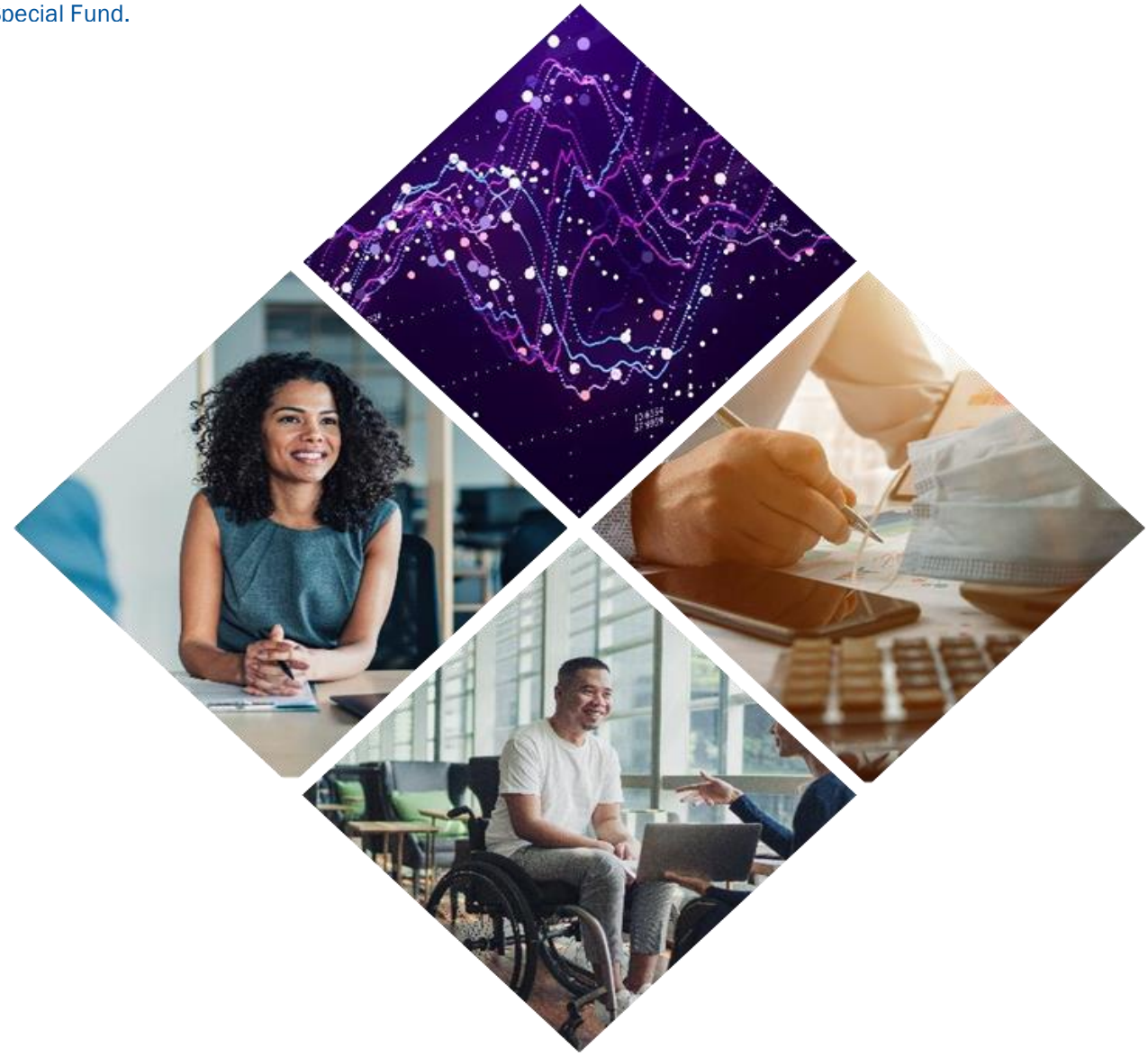
An Assessment of the SME Sector in Turkiye

Recommendation of a Data-based Methodology

November 2022

This report is produced within the EBRD Technical Cooperation Project: "*Strategic guidance to the SME Turkish Agency KOSGEB for support and strengthening of the SME framework*," implemented by the EBRD and funded by the EBRD Shareholder Special Fund.



Acknowledgements

This report was written by Vedat Akgiray (Professor of Finance), Ali Coşkun (Associate Professor of Accounting) and Serhat Çevikel (PhD candidate, data scientist) of Boğaziçi University, Istanbul. Their special thanks are first due to Catherine Bridge Zoller (Senior Counsel, EBRD) and Natalia Pagkou (Legal Consultant, EBRD) for their valuable guidance and help throughout the whole study, and Cagatay Bircan (Lead Research Economist, EBRD) for his insightful input. The authors gratefully acknowledge the intellectual contributions of the project advisors, Rodrigo Olivares-Caminal (Professor in Banking and Finance Law, Queen Mary University) and Serdar Çelik (Head of Corporate Governance and Corporate Finance Division, OECD). All senior managers at KOSGEB (Selim Serkan Ercan, Bahar Özer Erdoğan, Ali Rıza Ozan Kemaloğlu, Neriman Pınar Işın, Esra Ateş Kaya) deserve our gratitude for their contribution and patience at times. Personal thanks are also due to Erhan Çetinkaya (president of TUIK), Erdal Erdem (president of KGF), and Ekrem Keskin (secretary general at Banks Association of Turkiye). All opinions in this report are solely those of the authors, and no institution or individual mentioned here or elsewhere in the report has any responsibility for any part of the content.

Executive summary

The SMEs in Turkiye produce 72% of total employment and more than thirty million people's livelihoods are directly dependent on employment by SMEs. The share of SMEs is 42% in total value added, 50% in total sales and about 30% in direct foreign trade. SMEs are important both socially and economically. But they are also more fragile in times of economic slowdowns and disruptions such as the Covid-19 crisis. Compared to other economies of similar size, SMEs in Turkiye still seem to be more resilient because of cultural factors, demographics, and support by KOSGEB in hard times.

However, this study identified several areas of improvement that can lead to a healthier financial and economic environment for SMEs. Two areas stand out:

- The insolvency regime in general does not provide an efficient platform of reorganisation and restructuring for viable companies under financial distress. This problem is more damaging for SMEs, often because they cannot afford costs of reorganisation and they do not have the needed guidance. Furthermore, lack of adequate publicly available data on insolvency cases makes it difficult to conduct reliable empirical work on the subject and design properly targeted policies.
- SMEs have inadequate and suboptimal access to bank finance. Their share in total bank credit is markedly lower than their share in total production and sales in the country. Furthermore, SMEs' access to market-based financing is almost negligible. This results not only in high exposure to financial risks during economic slowdowns but also in poor corporate governance and its repercussions.

Against this background, various data analyses are conducted on several big databases held at the Ministry of Industry and Technology, on SMEs and large companies in Turkiye. The purpose is to identify the critical financial and non-financial indicators that can trigger financial distress and probable insolvency for SMEs. The methods and findings are expected to lay out a framework for a data-based methodology KOSGEB can use in policy design and implementation.

The study uses data on all small and medium-sized enterprises during the period 2017 – 2020. The approach is based on investigating companies' performances, using several different algorithms, throughout the three-year period from 2017 to 2019 and discovering whether they continued business or became insolvent in 2020. Some key findings include:

- Behaviour of standard financial ratios during the 2017 – 19 period contains clear signals of insolvency in 2020. Although exact reasons at the company level are not uniquely known, short-term illiquidity due to limited access to finance stands out as a major cause of insolvency.
- Despite the popular view otherwise, companies with higher export orientation seem to be more fragile financially than those with higher import orientation. There may be several reasons for this such as competitive capacity but the channels of impact of currency risk on foreign trade by Turkish companies may need to be re-examined.
- Probability of insolvency is higher for new and youngest companies; it decreases fast with age until 13 years in business and stays flat until about thirty years in business. Youngest and oldest companies are more likely to go out of business. Gender composition at managerial and professional positions does not seem to affect financial

performance. However, as women's participation in labour force in Turkiye is relatively low, this finding may need to be reassessed in the future.

- The databases used in the study are fed in by company reports, some of which are legally required, and some are optional. It is found that the amount of reported information and its behaviour over time are meaningful signals of potential insolvency. Companies, which report less and decreasing information, are more likely to turn insolvent – even without specific regard to the quality of reported information.

The report concludes with some high-level policy recommendations to reform the underlying structure of the SME economy in Turkiye. Some specific policy guidelines are also proposed. These are based on the empirical findings, and they are readily applicable in response to economic problems triggered by the Covid-19 pandemic and current geopolitical conflicts. Empirical findings also point to the need for evidence-based policy making. A framework is described to design a data-based methodology to map the interconnections between the SMEs themselves, and between the SMEs and larger companies. This is expected to help design better targeted policies by KOSGEB.

Table of Contents

List of tables

List of figures

Introduction

Small and medium-sized enterprises (SMEs) constitute the major lifeblood of all economies in the world. Globally, they generate three quarters of employment and half of total production. In national and global value chains, SMEs have systemic importance in that they are either critical suppliers or customers of large companies. It is impossible to envision a free-market economy without SMEs. The long-run growth of an economy and increase of welfare depend on entrepreneurial courage and a system that nourishes and rewards such courage. Most large companies of today were SMEs of yesterday.

On the other hand, SMEs also represent the most vulnerable and fragile part of an economy. As a current case in point, the COVID-19 pandemic and the subsequent disruption in business activity hit the SMEs first and most[1]. There are many reasons for this. SMEs naturally have less developed managerial capabilities and often poor corporate governance. SMEs' access to financial markets is limited and, whenever available, short-term bank and trade credit are the only source of external financing. For these and other reasons, many countries have set up governmental agencies specifically tasked to support and guide SMEs. Examples are the Small Business Administration in the USA, the Ministry of SMEs and Start-ups in South Korea, BVMW in Germany, and KOSGEB (the Turkish SME Agency) in Turkiye. Similar agencies can be found in all European countries.

Governmental support of SMEs is necessary and appropriate. However, in addition to the usual political short-termism of governments, the basic concept of support itself may come with a risk of moral hazard. Businesses should not take for granted the luxury of guaranteed government help whenever problems occur. There must be a natural limit to this expectation and public policy should recognize this fact. Consequently, in today's world of abundant data, public SME policies should be based on what real data says and implies. This study adopts this understanding.

This report presents the findings of a research project supported by the EBRD, to design a framework of a data-driven methodology for KOSGEB to assist Turkish SMEs in response to the economic impacts of the Covid-19 pandemic. At the time of drafting this report, the pandemic has subsided, but its final negative effects are still to be observed and measured. The data used in the study includes reported company information until the end of 2020. When 2021 data becomes available in the fourth quarter of 2022, a clearer account of the pandemic's effects on SMEs may be drawn spanning a longer time.

Although the current topic is about the Covid-19 pandemic, the approach in the study is not necessarily limited to that. It presents a relevant methodology for similar economic disruptions in the future. Hence, the findings and recommendations may be viewed as a first step towards a long-term sustainable financial strategy for the public sector to support SMEs in Turkiye.

The report is organized in three sections. The first section describes the SME economy in Turkiye. This includes selected indicators such the size of the SME sector, employment, sales, value added, and foreign trade. Simple observations on SMEs' economic productivity compared to large companies are also presented. International comparisons are also

[1] A few recent studies are (Carvajal, Davis, Divakaran, & Konidaris, 2020), (Gourinchas, Kalemli Özcan, Penciakova, & Sander, 2021), (Facebook / OECD / World Bank, 2020)

provided as needed. The section also discusses major factors of Turkish SMEs' vulnerability and resilience in general and in times of disruption. Some issues of corporate governance and access to capital markets are discussed. Current insolvency regimes and second-chance opportunities for troubled SMEs are evaluated. The section concludes with an overview of business sentiment of SMEs in Turkiye during 2020, the first year of the pandemic.

The second section presents the data analysis methodology and findings. The analysis is conducted in four related steps, which together form a set of criteria that can identify signsof possible financial deterioration. The first step investigates whether trends in certain financial indicators carry any useful signals of potential distress and insolvency for systemically important SMEs.[2] As fluctuations in foreign exchange rates present both risks and opportunities for Turkish companies, the second step investigates whether foreign-trade intensity can provide additional information to complement the first step. The third step attempts to find relations between financial distress and company age on one hand and gender composition on the other. The fourth step investigates whether deterioration in reporting quality may be another signal of financial distress.

Based on the findings in the previous parts, the last section describes a framework of a data-driven methodology, using specific algorithms[3], for KOSGEB to evaluate and develop. The section concludes with a set of high-level recommendations about a revised public policy for SMEs. The major recommendation is that KOSGEB may put forward a new model of SME support and guidance, where many obstacles are removed, and problems are solved via an intelligently designed financial market structure. This will not only lead to more productive and resilient SMEs but also increase the policy effectiveness of KOSGEB.

[2] The SME sector "as a whole" is systemically important. But, by definition, no single SME can be systemically important by itself. However, as explained later, from a purely economic and financial perspective, it is necessary to identify the subset of SMEs that because their operating nature (be it size, complexity, interconnectedness, dependence, etc.), when faced with the risk of possible financial deterioration, can spread this risk to other SMEs within the same subset or other interconnected subsets (either vertical or horizontal subsets) and therefore creating a systemic risk within the SME 'ecosystem'. The companies in this subset are called "systemically important SMEs" in this study.

[3] All algorithms used in the context of this study shall be made available to KOSGEB, together with an explanation for their use and potential to assist KOSGEB.

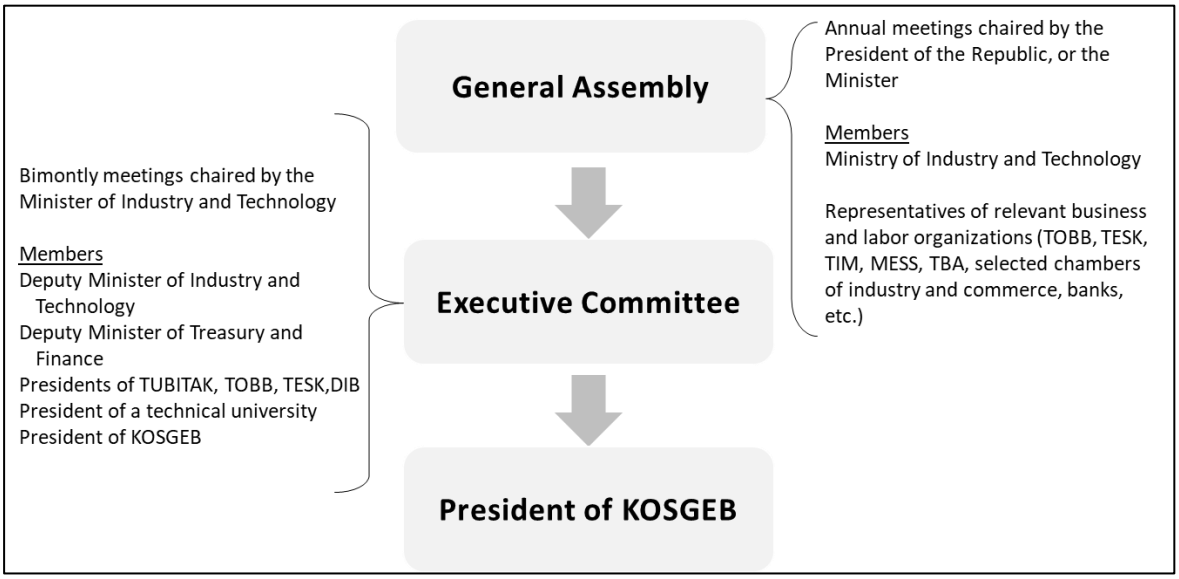
KOSGEB and the SME landscape

KOSGEB's role and functions

KOSGEB (Small and Medium Enterprises Development Organization) was established by Law #3624 in 1990, to provide services and support for SMEs in the production industry. The law was later amended in 2009, providing the legal ground for KOSGEB to expand its support to SMEs in other industries. The Cabinet Decree #15431 in the same year specified the sectoral and regional priorities in KOSGEB's services and support programmes. The most recent amendment was made by the Presidential Decree #4 in 2018 (KOSGEB, 2022).

Accordingly, the "KOSGEB Strategic Plan 2019-2023" (KOSGEB, 2019) defines a framework of a coordinated SME policy and implementation. In addition to provisions for monitoring and evaluation by KOSGEB, the main objectives are expressed as increasing productivity and competitiveness of SMEs, innovation, digitalization, R&D, capacity building, and promoting entrepreneurship. Currently, these are accomplished through several support programmes developed and managed by KOSGEB. The decree in 2018[4] describes the governance structure of KOSGEB as summarized in Figure 1:

Figure 1: Governance structure of KOSGEB



The General Assembly, chaired by the President of the Republic or the Minister of Industry and Technology, is made up by representatives from almost all segments of the economy. The Assembly sets the annual strategic goals and policy missions of KOSGEB. The Executive Committee is basically the board of directors of KOSGEB, and it is responsible for the governance of the organization. KOSGEB's president is the general manager, under whom there are vice-presidents and several departments with defined tasks.

KOSGEB's direct support for SMEs are financed within its own budget, annually approved by the Turkish Parliament via the same procedure applied to other government agencies. Direct support programmes include all KOSGEB services to SMEs in areas of entrepreneurship,

[4] Full text of the decree can be found at https://webdosya.kosgeb.gov.tr/Content/Upload/Dosya/Mevzuat/cbaskanligi_4_kararname.pdf

technology, capacity building, and financial help (interest-free credit, grants, emergency aids).[5]

KOSGEB also provides indirect support for SMEs in their access to various types of finance. This is accomplished through the following joint ventures and partnerships:

- Credit Guarantee Fund (*www.kgf.com.tr*)
- Technology Development Zone Teknopark, Inc. (*www.bilisimvadisi.com.tr*)
- SME Venture Capital and Investment Trust (*www.kobias.com.tr*)
- Turkish Investment Fund, Inc. with two funds established in Luxembourg: Istanbul Venture Capital Initiative, and Turkish Growth and Innovation Fund
- Technology Development Zone Venture Capital Fund (*www.bilisimvadisi.com.tr*)
- Regional Development Fund (*https://kalkinma.com.tr/en/home*)
- Technology Innovation Fund (*https://teknolojiinovasyonfonu.com.tr*)

The most recent directive (dated 18.03.2022) defines an SME as a company with fewer than 250 employees and with an annual sales figure less than or a balance sheet size smaller than TRY 250 million.[6] KOSGEB further classifies SMEs in three size categories (micro-SME, small SME, and medium-sized SME) as shown in Table 1[7]:

Table 1: Definitions of SMEs in Turkiye

		Micro	Small	Medium-sized
Number of employees	Old	1 – 9	10 – 49	50 – 249
	New	1 – 9	10 – 49	50 – 249
Annual sales (TRY million) Annual sales (€ million)	Old	< 3	< 25	< 125
	New	< 5 < 0.3	< 50 < 2.9	< 250 < 14.3

KOSGEB's definition is the same as the EU definition in terms of number of employees but differs from the EU in annual sales and balance sheet size. In the EU-27, micro, small and medium-sized SMEs are categorized with upper limits of €2 (€2), €10 (€10), and €50 (€43) million in sales (balance sheet size), respectively (European Commission, 2021).[8] There is a scale difference between Turkiye and the EU. Small SMEs in Turkiye would be classified as micro-SMEs in the EU and many medium-sized SMEs as small SMEs.

The Turkish Statistical Institute reports 3,295,995 SMEs and 8,071 large companies in the country in 2020. Numbers of companies in each category with average employment and

[5] Detailed descriptions of specific support programmes can be found at: *https://en.kosgeb.gov.tr/site/tr/genel/destekler/3/supports-services*.

[6] The upper limit before 2018 was TRY 40 million, and then TRY 125 million until March 2022. The analyses in the study for 2017 – 2020 are based on these old categorizations.

[7] Unless otherwise referenced, all raw data used in this and next section are obtained from the website of the Turkish Statistical Association, *www.tuik.gov.tr*. Conversion into other currencies is done using each corresponding year's average exchange rate.

[8] An exact definition of an SME may be more complicated than these simple size-based definitions for both Turkiye and EU countries. For instance, a small company within the given thresholds may be a partially or fully owned subsidiary of a large company. Similarly, a small company may be indirectly controlled by a large company. A large holding company may be structured as a consolidated parent of companies all of which are SMEs as currently defined.

average sales for the year 2020 are given Table 2 (TURKSTAT, 2022). In 2020, 99.8% of all companies were SMEs, and 91.9% were micro-SMEs.

Table 2: Average statistics about SMEs

	SMEs			Large companies
	Micro	Small	Medium	
Number of companies	3,035,095	223,626	37,274	8,071
Percentage of companies	91.9%	6.8%	1.1%	0.2%
Annual sales / company (TRY)	381,275	8,711,322	57,127,524	661,646,135
Annual sales / company (€)	€47,422	€1,083,497	€7,105,413	€82,294,295
# employees / company	2	14	70	553

To compare with the 3.3 million SMEs in Turkiye, there were 21 million SMEs in the EU-27 countries in 2020 (European Commission, 2021). These translate into 39 SMEs per 1,000 people in Turkiye and 47 per 1,000 people in the EU. Turkiye has fewer and smaller SMEs than the EU average. In closer proximity, the average number of SMEs in the Western Balkan countries (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia) is 32 SMEs per 1,000 people (OECD, 2021), which is lower than that in Turkiye.

It is interesting to note that SMEs account for exactly 99.8% of all enterprises in Turkiye, EU-27 countries and non-EU Balkan countries. Of this total, 91 – 93% are micro-SMEs in all regions. Similarly, SME's shares in total employment in these countries are all in a small range of 65 – 74%. Hence, the societal landscape of SMEs is remarkably similar in all of Europe. Differences between countries become visible when financial and economic metrics are considered.

Table 3: Sectoral distribution of SMEs

	# Companies		Sales		Employment	
	Micro	Small / Medium	Micro	Small / Medium	Micro	Small / Medium
Manufacturing	**10.9%**	2.0%	2.5%	**19.7%**	7.0%	**17.3%**
Construction and Real Estate	8.0%	1.1%	2.0%	7.3%	5.0%	7.3%
Wholesale and Retail Trade	**33.7%**	2.8%	**12.6%**	**41.0%**	**16.9%**	**10.4%**
Transportation and Storage	**13.7%**	0.5%	1.8%	3.4%	6.5%	2.9%
Accommodation and Food	8.4%	0.5%	0.7%	1.1%	4.7%	3.5%
Information Technologies	7.9%	0.5%	1.2%	2.6%	4.5%	2.8%
Education, Health and Other	9.4%	0.7%	0.6%	3.5%	4.8%	6.4%
Total (%)	92.0%	8.0%	21.5%	78.5%	49.3%	50.7%
Total	3,295,995		5,234,656 (m TRY)		11,488,623	

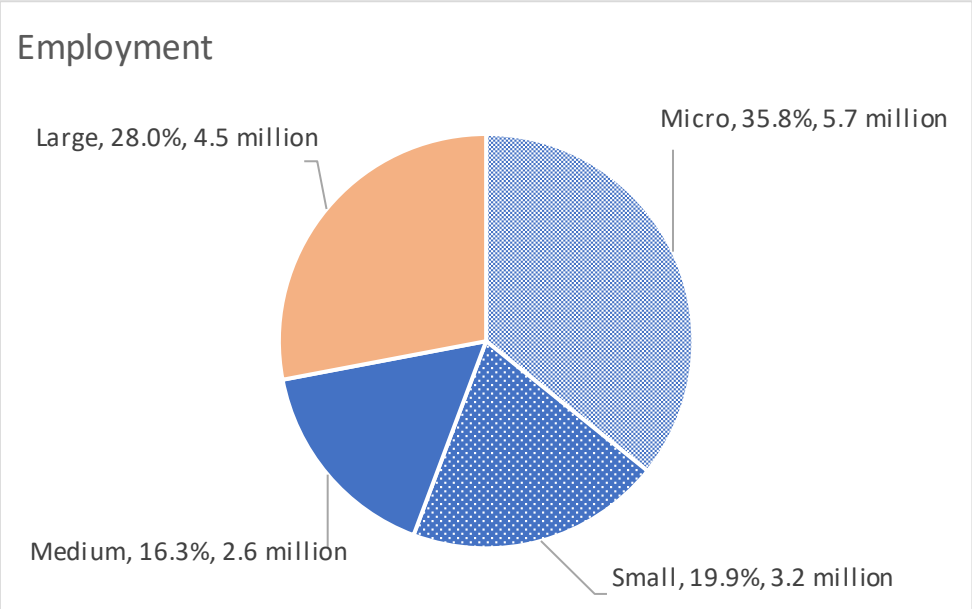
A sectoral decomposition of SMEs in Turkiye shows that manufacturing and wholesale/retail trade sectors are two leading sectors, generating 25% and 28% of total SME employment, respectively. These two sectors combined constitute about 76% of total SME sales, which is largely sales by small and medium-sized SMEs. Some details (based author's calculations with data from TUIK (TURKSTAT, 2022) are given in Table 3.

The SME economy in Turkiye

As in many other similar-sized countries, SMEs in Turkiye play a critical role, both economically and socially. As often the case for many countries, SMEs are the lifeblood of the Turkish economy, too. First, SMEs employ about 11.5 million people. This constitutes about 72% of total employment and this has not changed much over the last decade. Considering a typical Turkish household size of 3.23 people and assuming one per family is employed by SMEs, livelihoods of more than thirty million people depend on employment by SMEs.

Number of people employed and percentage share of each size category for 2020 are given in Figure 2. In Turkiye, the biggest employer is the micro-SME category and, together with small SMEs, they make up about 56% of total employment. These numbers include both paid and unpaid employees. Almost all unpaid employees are in micro-SMEs, and they are typically owners of companies and unpaid family members. When unpaid employees are excluded, employment share of micro-SMEs drops to 23% from 35.8%. In other SMEs and large companies, such differences between numbers of paid and unpaid employees are not seen.[9]

Figure 2: Distribution of employment by company size



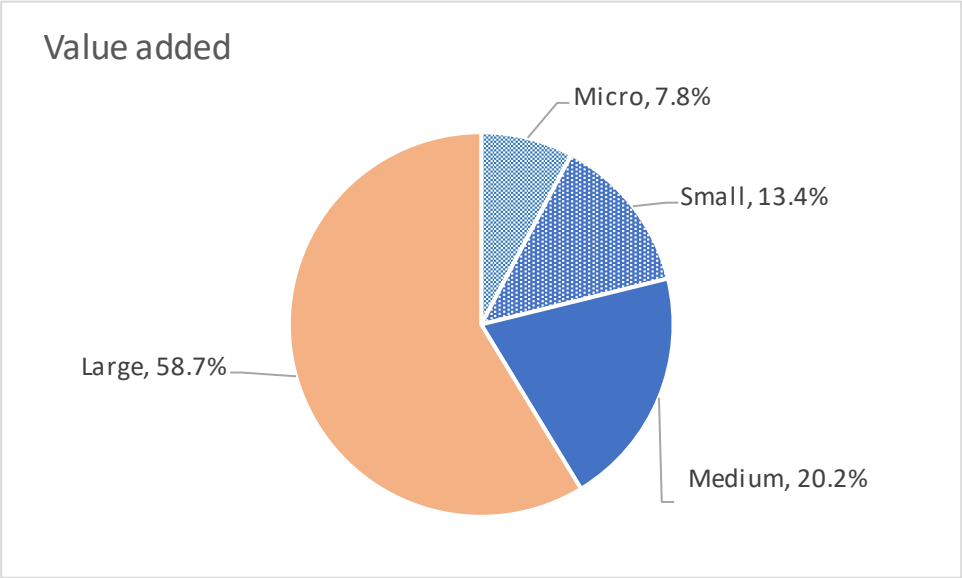
For comparison, in the EU-27 countries, average percentage shares of SME categories in employment are 29.2% micro-SMEs, 20% small SMEs, and 15.9% medium-sized SMEs

[9] All these statistics are based on data reported by companies and hence they do not include unregistered employment and business activity. Unregistered employment is known to exist largely in seasonal agriculture, which, if registered, would have been classified largely under the category of micro-SMEs.

(European Commission, 2021). These add up to 65% for all SMEs with the remaining 35% of employment in large companies. Although numbers change across countries, EU-27 SMEs have a lower share of total employment than those in Turkiye, the difference stemming from registered employment shares of micro-SMEs (35.8% in Turkiye vs 29.2% in EU).

In 2020, with 72% of employment, SMEs in Turkiye produced a total value added (at factor costs) of 682 billion TRY (about €85 billion), which constitutes 41.3% of the total for all companies. As shown in Figure 3, as the biggest employer category, accounting for 35.8% of total employment, micro-SMEs have the smallest contribution to value added (7.8% of total). This asymmetry diminishes as company size increases. Value added per employee is 23, 70 and 128 thousand TRY in micro, small and medium-sized SMEs, respectively. These may be compared with 217 thousand TRY of value added per employee in large companies.

Figure 3: Distribution of value added by company size



For comparison, in the EU-27 countries, the percentage shares in value added are 18.7% for micro-SMEs, 17% for small SMEs, and 17.3% for medium-sized SMEs. These add up to 53% for the whole SME sector (European Commission, 2021). Average value added per employee is markedly higher in EU countries than in Turkiye. In 2020, the total sales by SMEs in Turkiye were 5.23 trillion TRY (~€652 billion), which corresponds to 49.5% of the total sales figure of 10.57 trillion TRY (~€1.32 trillion). Categorical shares are shown in Figure 4.

A closer observation reveals that, compared to large firms, SMEs in Turkiye have lower productivity, and they are more vulnerable to economic slowdowns. Percentage shares of large firms and SMEs (excluding micro-SMEs) in totals for five economic measures (change in inventories, purchases, sales, production, and value added) are Figure 5. Compared to large firms, SMEs purchase relatively more goods and services but produce and sell less. In 2020, their share in total purchases by all firms was 45% but their share in total production was only 37%. SMEs' share in total value added was even lower. This not only results in unnecessary levels of inventories but also implies a risk of further build-ups in inventories in times of reduced demand and business disruptions. Considering their limited access to finance, this can be seen as a clear sign of financial vulnerability, especially for SMEs with already elevated levels of debt before slowdowns.

Figure 4: Distribution of sales by company size

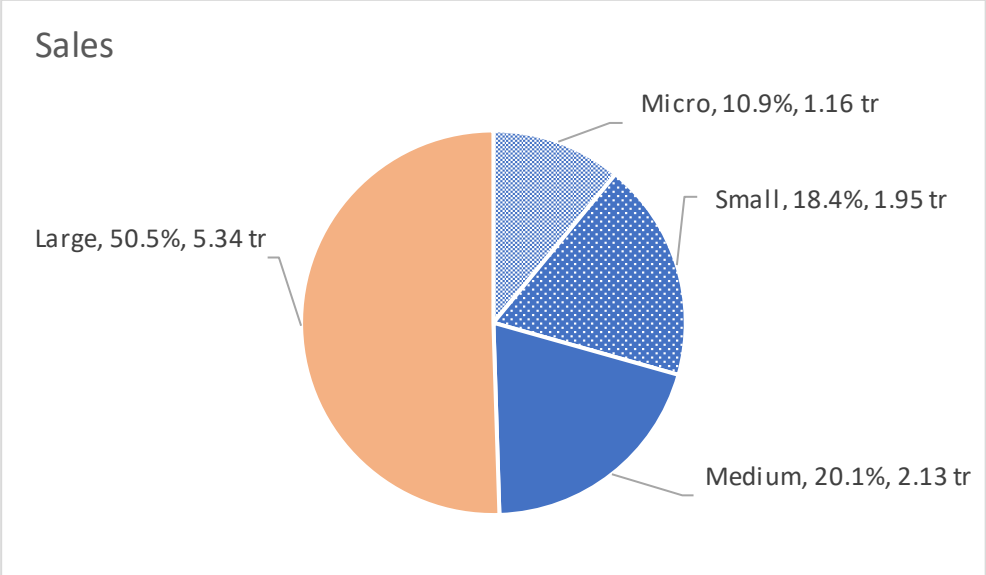
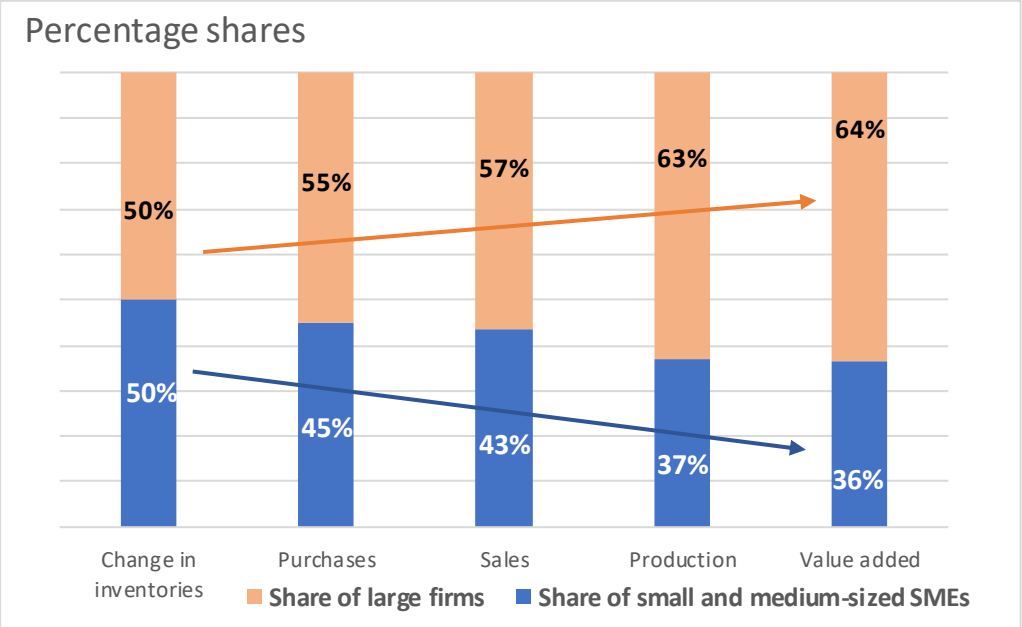


Figure 5: Shares of large companies and SMEs in key economic measures



As a first-step measure of any negative impact of the pandemic on SMEs, changes in SMEs' shares in some economic measures from 2019 and 2020 are given in Table 4. Share of SMEs in total sales, value added at factor costs, and employment have all declined slightly from 2019 to 2020, showing a disproportionate negative impact of the pandemic on SMEs. This partially evinces the finding of higher vulnerability of SMEs. Furthermore, and as expected, micro and small SMEs seem to have suffered a bigger negative impact on their sales and value added.

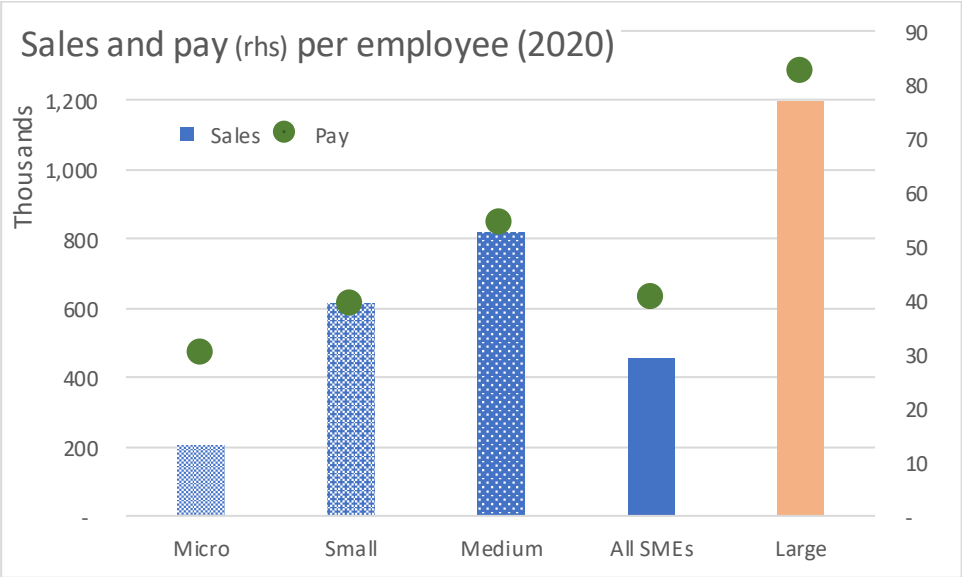
However, considering that only nine months of 2020 belonged to the pandemic period, a clearer picture should be available only when 2021 data is published in detail.

Table 4: Changes in SMEs' shares (2019 -2020)

	Sales		Value added		Employment	
	2019	2020	2019	2020	2019	2020
Micro	11.9%	10.9%	8.9%	7.8%	35.9%	35.8%
Small	19.4%	18.4%	14.8%	13.4%	19.9%	19.9%
Medium	19.1%	20.1%	20.2%	20.2%	16.6%	16.3%
SME total	**50.4%**	**49.5%**	**44.0%**	**41.3%**	**72.4%**	**72.0%**
Large	**49.6%**	**50.5%**	**56.0%**	**58.7%**	**27.6%**	**28.0%**

Compared to large firms, SMEs in Turkiye have lower sales and pay per employee: sales of 455,638 TRY/employee versus 1,196,223 TRY/employee and pay of 40,941 TRY/employee and 82,978 TRY/employee, for SMEs and large firms, respectively. Within the SME sector, micro-SMEs have the lowest sales per employee and the lowest pay per employee. Comparisons for SMEs of different sizes are given in Figure 6.

Figure 6: Sales and labour productivity



However, as a rough indicator of sales productivity, the average sales/pay multiplier in small and medium-sized SMEs is 15.2, which is slightly higher than 14.4 for large companies. This multiplier is as low as 6.6 for micro-SMEs, again implying higher vulnerability to economic disruptions compared to larger SMEs and large companies. These numbers may also be evaluated from a perspective of labour policy.

Finally, regarding foreign trade, SMEs' share in total exports was 36.4% and share in total imports was 24% in 2020. Monetary values are given in Figure 8. Although this is a rough calculation ignoring pass-through effects on the supply chain, it implies two observations. First, SMEs are more oriented to domestic business in that they make up about 50% of total domestic business and only about 30% of foreign trade. Second, SMEs' foreign business resulted in a direct trade surplus of $9.5 billion while large companies ended up with a total trade deficit of $59.4 billion including energy imports and $29.8 billion excluding energy.

Figure 7: Composition of foreign trade

As a final note, SMEs' share in exports and imports in 2019 were 36.6% and 21.5%, respectively. From 2019 to 2020, these show a slight decline in share in exports but a significant increase in share in imports. These observations will be elaborated in the next section.

Structural, institutional, and regulatory framework

Sources of economic vulnerability and resilience

As summarized above, the SME sector in Turkiye is highly populated with low-productive micro and small SMEs, contributing to 56% of total employment but only 21.2% of total value added in the economy. Micro-SMEs have a large population of self-employed people, family members and unregistered workers. Compared to larger SMEs, micro-SMEs are more widely involved in unregistered business activity. This represents a major challenge for policy makers in reaching out to micro-SMEs and, to a lesser extent, small SMEs in times of economic disruption. During the Covid-19 pandemic, 16% of Turkish SMEs were able to access government support, well below the OECD average of 33.6% (OECD, 2021). Those unable to access support were largely micro-SMEs. As a result, micro-SMEs (largely in labour-intensive and contact-intensive lines of business) were hit the first and hardest by the pandemic. The difficulty in access to government support has been a major source of vulnerability for micro-SMEs.

Considering their shares in total trade on one hand and in foreign trade on the other, SMEs in Turkiye seem to be more exposed to disruptions in global value chains than SMEs in other OECD countries (OECD, 2021). Disruption in long global value chains effects exports and imports directly as demand falls, and indirectly as foreign direct investment may also be impacted. Although 2021 data may provide a clearer picture, the change in SMEs' share in exports from 2019 to 2020 seems to evince SMEs' exposure to global value chains.

Physical restrictions during the pandemic exemplified yet another source of the economic value of digital readiness. However, Turkish SMEs have not yet fully adopted digital tools of business. This is despite various technical support programmes offered by KOSGEB. Percentage of SMEs using social media, e-commerce and cloud computing are 48.1%, 9.2% and 11.9%, respectively. These numbers may be compared with OECD averages of 53%, 22% and 35% (OECD, 2021) . However, recent surveys by KOSGEB (see below) show that Turkish SMEs may have moved fast in digitalizing their sales models during the pandemic.

Innovation skills (start-up capability and intelligence, computing skills, flexibility, and handling complexity) of Turkish entrepreneurs are well above OECD averages. This is widely seen in the start-up enthusiasm of university students and younger family members of businesspeople. For example, after the initial shock of the first two months of the pandemic (March and May of 2020), the number of new firm entries increased sharply resulting in a net cumulative increase of 22% for the year. Demand and supply for innovation skills seem to well balanced. This is a notable factor of resilience and source of potential growth for SMEs.

Institutional framework

The main public policy tool regarding SMEs in Turkiye is the development and support framework administered by KOSGEB. In policy design and implementation, KOSGEB sometimes cooperates with the Ministry of Science and Technology, Ministry of Trade, and TUBITAK (the Scientific and Technological Research Institution of Turkey).

In general, there are four broad categories of support directly provided by KOSGEB within the limits of its own budget. These categories and the monetary value of the support under each category during the period January 2019 – August 2022 are:[10]

- Technology: R&D support, support for investment in technology, incubation centre
    - TRY 973 million (€116 million)
- Entrepreneurship: Development support, business plan reward, acceleration help
    - TRY 2,536 million (€271 million)
- SME Development: Productivity and competitiveness support, EU Green Deal
    - TRY 2,377 million (€298 million)
- Finance: Credit interest support facility, zero-interest rapid credit with easy terms
    - TRY 4,377 million (€342 million)

KOSGEB also provides temporary support to SMEs in disaster-stricken areas (about 185 million liras, or €23 million, during the same period).

In addition to these direct supports and as mentioned before, KOSGEB provides indirect support through the Credit Guarantee Fund (KGF), which is a quasi-government agency established as a corporation in 1991. The major shareholders of KGF are KOSGEB and TOBB (Union of Chambers and Commodity Exchanges of Turkey), each with a 28.3% share. The remaining shareholders are banks with a total share of 43.4%. KGF's mission is to act as a

[10] The data is kindly provided by KOSGEB staff, and categorization is by the authors.

credit guarantor for SMEs and other companies, which cannot provide sufficient collateral for bank credit, and hence help them access to finance (KGF, 2022).

During the period 2017 – 2021, KGF has guaranteed a total credit volume of €104 billion, of which €80 billion (77%) was bank credit to SMEs and the remaining €24 billion (23%) bank credit to other companies. The financial source of the guarantee was 98% provided by the Turkish Treasury and 2% backed by KGF's own capital.[11] The guarantees by KGF are capped at 7% of total credit extended under the scheme. For example, up to 7% of the total €104 billion of unsecured credit is fully guaranteed in case of non-performance.

The total amount of KGF-guaranteed bank credit to SMEs was €10.1 billion in 2019 and it increased to €19.8 billion in 2020. This sudden increase was due to a policy action by the government against the Covid-19 pandemic. It was also the first instance of KGF being used as a major policy tool in times of business disruption.

Regulatory framework

Although there is still room for progress, the regulatory framework for entrepreneurship in Turkiye can be described as business friendly. According to the World Bank's index on ease of doing business,[12] Turkiye ranks 33rd among 190 countries in 2020 and it has consistently moved up in past years (World Bank, 2020). This index is based on various measures such as cost of start-up procedures (6% of income per capita in Turkiye versus 20% worldwide), number of start-up procedures (7 in Turkiye versus a world average of 8) and administrative complexity. However, once the start-up phase is completed, other aspects such as minimum capital requirements for incorporation and costs of audit and credit scoring come into play. These naturally constitute a comparative disadvantage for SMEs.

The health of a free-market economy depends on the economic efficiency of both entry and exit by entrepreneurs. Hence, market mechanisms and insolvency regimes must be designed to ensure optimal exit. This, in turn, requires adequate access to finance and a legal framework that can properly differentiate between viable and non-viable companies. Viable companies should be given the opportunity to reorganize and continue. Non-viable companies must be forced to exit in a timely manner and with minimum losses for creditors and debtors.

These principles are of more practical importance for SMEs than for large firms because they do not have as much access to finance, hindering any chance of continuation via reorganisation. As costs of reorganisation may be too high relative to an SME's size (especially for micro and small SMEs), creditors may simply opt to write off instead of restructuring. Furthermore, it is easier for an SME to disguise its true financial health and debt servicing capability. Most "zombie" firms[13] are SMEs. Insolvency and reorganisation procedures must recognize these facts.

The global joint standard setters for insolvency regimes are the World Bank's ICR Task Force (World Bank, 2021) and the United Nations Commission on International Trade Law (UNCITRAL) (United Nations, 2004 - 2021). They have been engaged in continual work since the late 1990s and publish updates as needed. The most recent updates cover areas such as the impact of Covid-19, or similar disruptions, on micro, small and medium-sized

[11] The data on KGF credits was kindly provided by KGF staff.
[12] Recently, there were discussions about the soundness of this index and the World Bank has decided to discontinue it. However, it still conveys a picture of business environments.
[13] Zombie firms are firms that are unable to service their debts from current and expected cash flows, and hence they need ever more debt to continue.

enterprises. The World Bank, in its 2021 Principles for Effective Insolvency and Creditor/Debtor Regimes and 2022 World Development Report (World Bank, 2022) has placed the emphasis on micro and small enterprises (MSEs). The World Bank principles now contain a sub-section devoted to MSE Insolvency.[14] Similarly UNCITRAL has worked on guidance for policymaking for MSEs. UNCITRAL has also issued legislative recommendations targeting specifically insolvency of MSEs (United Nations, 2021). The UNCITRAL recommendations constitute an exhaustive guide for governments wishing to facilitate MSEs to restructure their debts or liquidate faster, simpler and in an affordable way. Furthermore, the new Part 5 of the UNCITRAL Legislative Guide on Insolvency contains comprehensive guidance for the development of domestic insolvency laws tailored for MSEs.

The European Union has also emphasised the need for SME specific measures in EU national legal frameworks in the Directive (EU) 2019/1023 on preventive restructuring frameworks. In addition to emphasizing the need for economic and procedural efficiency of insolvency systems, the major theme in all these standards and recommendations is that the foremost priority must be to save the companies and give them a second chance. If and only if this is not economically feasible, then they should be let go through a fast and fair process (European Union, 2019/1023) (World Bank, 2021) (Kristin van Zwieten, Eidenmuller, & Sussman, 2020).

A comprehensive overview of the insolvency regimes and business reorganisation procedures in the EBRD economies can be found in EBRD's current report (EBRD Legal Transition Team, 2022) with a special section on Turkiye (EBRD, 2022). The primary law for non-financial firms and natural persons in Turkiye is the Code of Execution and Bankruptcy, most recently amended in 2021. To prepare for the aftermath of the Covid-19 pandemic, two temporary Framework Agreements, based on the Banking Law, have been endorsed by financial institutions to enable easier out-of-court financial restructurings. Currently, voluntary out-of-court, in-court (concordat) and hybrid reorganisation procedures are all available, although the hybrid procedure is not used by the market in practice.

As of May 2022, the Framework Agreements seem to have been tapped into mostly by large firms with exposures over TRY 25 million. From October 2019 to May 2022, 292 large firms have restructured a total credit of TRY 99 billion (~€6 billion). On the other hand, 33 smaller firms with exposures below TRY 25 million have restructured TRY 409 million (~€24 million) of credit (Banks Association of Turkiye, 2022). Extent of benefits, if any, for SMEs is yet to be seen.

Unlike the Commercial Code, the Turkish insolvency regime under the Code of Execution and Bankruptcy does not inherently recognize the value of second chances for viable businesses. In a hypothetical case study across the G20 countries and based on World Bank data (OECD, 2021), the findings show the insolvency procedures in Turkiye are far from being efficient in several aspects:

- Costly (15% of debtor's estate versus a global average of 12%)
- Time-consuming (5 years to resolving insolvency versus a global average of 2 years)
- Low recovery rate (11% in Turkiye versus a global average of 63%)

Furthermore, the typical result of the insolvency process is the piecemeal sale of remaining assets and not maintaining the going concern. Similar outcomes are seen only in Argentina,

[14] World Bank Principles for Effective Insolvency and Creditor/ Debtor Regimes, C18 to C20 at pages 29 to 31.

China, Russia, and South Africa. Complete bankruptcy is often the result, and business continuation is a rare event.

As per Annex 10 of the EBRD Business Reorganisation Assessment,[15] out of the 39 EBRD economies, only Hungary and Kosovo insolvency frameworks offer a tailor-made simplified reorganisation procedure for SMEs. In North Macedonia and Turkiye, procedures dedicated to lower amounts of claims are available, while in Slovenia a company classified as a micro enterprise or entrepreneurs who meet the criteria of micro or small companies can opt for a simplified reorganisation (compulsory settlement) procedure (EBRD Legal Transition Team, 2022). The temporary frameworks agreements in Turkiye were designed partly for this purpose but they have offered little relief for SMEs so far. In this environment, SMEs cannot have much chance of survival once they fall into financial distress.

In Turkiye, there are also "Asset Management Companies" (currently twenty-two), which were legally established in 2005 under the Banking Law. Their assigned task is to purchase the non-performing loans (NPL) of banks[16] and other financial institutions and collect or restructure those debts. Their major purpose is understood as giving individuals and small enterprises a second chance via financial restructuring and reorganisation. However, the current practice has evolved into mere debt collection from individuals and further away from their intended mission of helping small enterprises. It may be necessary to revisit the strategic policy framework in this industry.

A critical problem in Turkiye is the lack of publicly available data on insolvency.[17] Without such data, it is impossible to study the insolvency status of businesses and observe the real events starting with financial stress and ending with either insolvency or reorganisation. A central data repository is necessary for any serious work on the current insolvency regime and to develop a fact-based preventive framework, especially for SMEs.

Access to finance

Globally, there are about 43,200 distinct companies listed in stock exchanges and at least 8,300 (19%) of these are SMEs. More than half of listed SMEs and more than 90% of total SME market capitalization are in the Asia-Pacific exchanges, led by China and Japan (World Federation of Exchanges, 2022). In American and EMEA exchanges, the share of SMEs in total market capitalization is almost negligible. With the notable example of China, SMEs do not seem to have any sizable presence in equity markets (World Federation of Exchanges, 2021).

In Turkiye, SMEs role in capital markets is even smaller. As of July 2022, in Borsa Istanbul (BIST), there are a total of 570 listed companies and 42 (7.5%) of these are SMEs. Of these listed SMEs, 31 are medium-sized and 11 are small SMEs. Number of listed large companies (528) constitute about 6.5% of the total number (8,071) of large companies in the country –

[15] In January 2022, the EBRD Legal Transition Programme published this report summarising the findings of research and assessment of business reorganisation within national bankruptcy and insolvency systems across the EBRD regions. The Assessment was a direct response to Covid-19 pandemic and the concern that insolvency systems around the world needed to be strengthened to support struggling businesses and to offer opportunities for corporate rescue, as well as insolvent liquidation.

[16] As of March 2022, the NPL ratio on credits to large firms is 2.2% (TRY 68 billion), 4.7% (TRY 60 billion) of credits to SMEs, and 2.5% (TRY 29 billion) of consumer credits. These imply an "NPL market" size more than TRY 160 billion (Banks Association of Turkiye, 2022).

[17] There is some publicly available information on business shutdowns (monthly reports by TOBB), on NPLs and bounced company checks (quarterly reports by TBA). These reports contain cumulative figures but no data at the company level. The needed data is scattered around many courts of Execution and Bankruptcy, and partly in trade registries.

a small percentage. Number of listed SMEs, on the other hand, make up about 0.1% of the number of medium-sized SMEs (37,274) alone – a negligible percentage by any account. Furthermore, there are no outstanding or past bond issues by SMEs in BIST (Capital Markets Board of Turkiye, 2022).

The dominant source of finance for Turkish companies is bank credit. Total bank credit in March 2022 was TRY 5,503 billion (net of NPLs), including corporate and consumer credit. Equity issues and corporate bond issues (by non-financial companies) are relatively negligible. Some indicative numbers are given Table 5 (Banks Association of Turkiye, 2022).

Table 5: Distributions of bank credit and market-based financing

	Bank credit to corporates (March 2022)			**Equity and bond issues** (Jan 2019 – March 2022)			
	Large	SME	Total	IPO	SPO	Bonds	Total
TRY billion € billion	3,081 186.9	1,265 76.8	4,346 263.7	18 1.1	73 4.4	68 4.1	159 9.6
	96.5%			**3.5%**			

Excluding long-term project credits[18], the average maturity of bank credits in Turkiye is about 3.2 years, and it is shorter at about 2.8 years for SME credits. Hence, a large portion of the total bank credit as of March 2022 is new or renewed credit since 2018. With this assessment, an immediate observation is that bank credit (plus similar products such as leasing and factoring) make up more than 97% of financial resources for Turkish companies. Market-based financing has a share of only 3 – 3.5%. A second observation is that SMEs, which constitute about 50% of total sales and 40% of total value added in the country, have been able to access only 29% of bank credit to corporates and 23% of total bank credit.

Clearly, SMEs in Turkiye are not well informed about financial markets. They do not have adequate access to bank credit and almost no access to capital markets. In recent years, there has been a fast-growing interest in alternative sources of financing such as venture capital and crowdfunding, and relevant regulations have also been put in place. But these markets are still in their infancy stages.

Crowdfunding is perceived by many as a digital revolution in access to finance. In 2018, the EBRD, published a study (EBRD and Clifford Chance, 2018) including a benchmarking exercise of the existing regulatory frameworks for lending-based and investment-based crowdfunding platforms in Austria, Dubai, France, Germany, the UK and the U.S, and elaborated on recommendations and best practices based on the findings. In Turkiye, the first legislative effort on crowdfunding was in 2017, when the Capital Markets Law was enriched with an extra provision regulating crowdfunding platforms. In 2019, the Capital Markets Board (CMB) published the Communique for equity-based crowdfunding. This was followed, in 2021, by the CMB Communique regulating lending-based crowdfunding. Currently, eight crowdfunding platforms operate *https://www.ebrd.com/documents/pdf-report-on-best-practices-for-regulating-investmentbased-and-lendingbased-crowdfunding.pdf*in Turkiye and they are licensed and supervised by the CMB. The total value of crowdfunding as of 2022 is estimated to be less than one hundred million euros.

[18] Loans for energy and infrastructure projects are typically denominated in foreign currencies and they have maturities between 5 to 15 years. These make up about 18% of total credit volume.

Venture capital (VC) has been a growing business in Turkiye in recent years and it can be organized legally as a VC investment trust or a VC investment fund. Both types are licensed and supervised by the CMB, based on the Capital Markets Law of 2012 and a follow-up CMB Communique for VC funds in 2014. Currently, there are seven VC trusts and 202 VC funds under CMB regulation. After the introduction of significant tax incentives for companies investing in VC funds in 2014 and 2015 and due to the relative ease of regulatory procedures, the number of such funds has been growing very fast. However, despite fast growth, the total asset value of domestic CMB-regulated VC funds and trusts is currently about €1.5 billion (TSPB, 2022). As mentioned before, KOSGEB has a number support programmes to help SMEs' access to venture capital.

In addition, SMEs *https://www.ebrd.com/documents/pdf-report-on-best-practices-for-regulating-investmentbased-and-lendingbased-crowdfunding.pdf*in Turkiye can raise working capital by factoring their accounts receivables and finance their purchases of fixed assets by long-term financial leasing. The *EBRD Survey of Factoring* (EBRD, 2018) highlighted the role factoring can play as a useful financing tool for efficient off balance sheet access to working capital, especially for SMEs where this is done on a non-recourse basis[19]. In 2012, the Turkish government introduced the Law No. 6361 on Financial Leasing, Factoring and Financing Companies. Factoring and leasing activities are licensed and supervised by the Banking Regulation and Supervision Agency. As of August 2022, the total value of factored receivables was €4.6 billion, and the total contractual value of assets acquired via financial leasing was €6.9 billion. In 2019, these figures were €5.6 and €11.7 billion, respectively (BRSA, 2022). Compared to the size of bank credit, these instruments comprise a small and shrinking segment of the credit market.

In many economies where the EBRD operates, finance is dominated by bank lending and banks typically provide credit against fixed assets, such as land and equipment. SMEs frequently do not have fixed assets, or their value is insufficient to secure the financing that they need to operate and grow. These factors constrain SME access to finance. The situation is similar in Turkiye, and SMEs still have to rely on the availability of bank credit, leasing, and factoring. However, any bank credit is typically provided on a short-term basis. Considering their limited levels of equity and long-term debt, heavy dependence on short-term bank credit is a source of financial fragility for SMEs in Turkiye.

Corporate governance in Turkiye is regulated and supervised by the Capital Markets Board. Regulation covers only publicly listed companies and capital market institutions. Consequently, even for medium-sized enterprises, corporate governance per se does not occupy any place in the business agenda of SMEs. Inadequate access to equity markets is a major handicap for good corporate governance.

The total equity market value of BIST companies has varied between 15 – 25% of the country's GDP for as long as BIST has existed. Globally, especially in developed financial markets, this ratio has wandered between 100 – 125% of GDPs during the last three decades. Hence, the Turkish economy has the financial potential to produce a much larger capital market where large firms and SMEs can reap the benefits of long-term equity and debt financing.

[19] Recourse is the right of a purchaser/factor to transfer the receivable back to the seller/assignor if the receivable cannot be collected.

The OECD annually publishes an SME Policy Index [20] report (OECD, 2022), which provides a detailed overview of the progress in the implementation of the principles of the Small Business Act (SBA) of Europe. The most recent version was published in 2022, and it covers the Balkan countries and Turkiye. Progress is monitored in accordance with the ten principles of the SBA. Since 2019, Turkiye has shown better progress than the other countries. However, two areas seem to stand out, which need faster and further progress. The first is the insolvency regime in so far as SMEs are concerned. The second area is SMEs' access to finance in all types. These assessments seem to agree with the SME landscape described in the above sections.

SME sentiment in 2020

In April, May, and December of 2020, KOSGEB conducted surveys of SMEs and the results provide valuable insights into the business sentiment during the first nine months of the pandemic.[21] At the time, various restrictions such as company shutdowns and travel bans were in full force. The April survey had a smaller scope and there were 17,394 respondents. The May and December surveys were significantly more comprehensive and there were 5,527 and 6,166 responding firms.

An average 75% of respondents were micro-SMEs, 50% were in the services industry and 30% were in manufacturing. At the time, all responding companies were older than four years. The relevant results of the surveys are summarized in Table 6.

Table 6: KOSGEB surveys in 2020

Issue	Percentage of responses		
	April	May	December
Cash flow problems	95%	94%	92%
Expect more than 50% decrease in sales	55%	67%	49%
Rented workplace	85%	85%	83%
Cancelled new investment / employment	78%	79%	79%
Layoffs	15%	33%	38%
Expected increase in debt	N/A	69%	87%
Fear of insolvency / termination in 6 months	63%	56%	32%
Satisfied with governmental support	26%	47%	28%
Digitalized / planning to digitalize	N/A	38%	49%

[20] The index was originally developed in 2006 by the OECD in partnership with the European Commission, the European Bank for Reconstruction and Development (EBRD) and the European Training Foundation (ETF).

[21] Complete survey reports are available at *https://www.sanayi.gov.tr/covid-19/rapor-yayin-ve-bilgilendirmeler#kosgeb-raporlari*

The results reveal expected problem areas. More than 90% of SMEs declare cash flow problems, around 80% expect to raise new debt to survive, and more than 30% express fear of imminent insolvency. Almost all companies expect a decrease in sales and about half expect more than 50% decrease in 2021. About 80% of SMEs have either cancelled or postponed new investment and employment. As of December, 38% of companies have laid off five or more workers. Although 60% are not satisfied with governmental support in general, employment support programmes (temporary employment support, tax deferrals, etc.) seem to have been instrumental in the relatively low rate of layoffs. In 2020, about half of the SMEs, which had no presence in digital business in 2019, had either digitalized their sales models or were planning to do so as soon as possible. This usually takes the form of only e-commerce for micro and small SMEs. In summary, the general sentiment of SMEs through the first year of the pandemic is bleak. Nevertheless, reading into the details of survey responses shows an ardent desire to survive and expectation for more government support.

In Turkiye, the first case of Covid-19 was reported in February 2020. Starting in March 2020, the Turkish government launched a comprehensive package of economic measures to alleviate the impact of the Covid-19 crisis.[22] Some measures were for the whole economy, and some targeted the SME sector specifically. A summary list is provided below.

- To de-stress the credit markets, the Central Bank removed any daily limits on liquidity provision to banks, and simultaneously reduced its policy rate by 100 basis points. The rate cuts continued in the following quarters to reach a cumulative cut of 825 basis points by the end of 2021.
- To prevent a possible wave of imminent financial failures, principal and interest payments on bank credits were postponed for three months, and longer if needed. Conditional on preserving employment levels, new loans for working capital needs were offered with low rates of interest and 6-month grace periods.
- The 90-day waiting period before falling in the NPL category was extended to 180 days by the Banking Regulation and Supervision Agency. As a complement, the Agency also allowed a higher credit-to-deposit ratio in bank balance sheets to continue until otherwise ruled. Banks were also given further regulatory comfort in restructuring their credits to hard-hit industries such as tourism and travel. As another temporary measure, the Capital Markets Board restricted dividend pay-outs by listed companies.
- Largely financed by the Treasury, the Credit Guarantee Fund increased its credit pool by about €10 billion in 2020 and started to provide low-interest long-term credit largely to SMEs and, when needed, to other companies as well.
- As an interim regulation, companies, which defaulted in the second quarter of 2020, could note “force majeure” in their credit records. The government also announced a moratorium on insolvency proceedings for two subsequent 3-month periods.
- A “Short Employment Allowance” programme was implemented by the government, subsidizing 60% of employee salaries in firms, which are designated as affected by the pandemic. Several new flexible work schemes were also introduced.
- Deferrals were allowed in tax payments (personal and corporate income taxes, VAT due, local taxes), social security premium payments, and payments on past due tax payables. VAT rates were reduced to as low as 1% in hard-hit service sectors.

[22] A comparative account of measures taken by different countries can be found in OECD’s 2020 report (OECD, Coronavirus (COVID-19): SME Policy Responses, 2020)

- In selected sectors, rent and utility payments were allowed to be postponed. As financial support for vulnerable populations, one-time grants were given to about 6.3 million families, and pension payments were increased.

In addition to the above governmental measures, KOSGEB also launched a series of support measures for SMEs:

- Beneficiaries of KOSGEB's project-based or entrepreneurship supports as of March 2020 or later were allowed an additional time of four months before final project evaluation. This facility ended in January 2022.
- Repayments on KOSGEB's reimbursable supports (due by June 2020) were postponed for three months without any charge of interest or deferral cost.
- SMEs, using KOSGEB's credit interest support facility, were allowed to postpone their payments due in April, May, and June 2020, for three months and free of charge.
- To ascertain rapid and timely reach to SMEs during the pandemic, KOSGEB's digital platforms were fast expanded to handle all technical and procedural matters with SMEs. The full process starting with application and ending with actual payment is managed electronically.
- In early 2021, using a credit line of $600 million by the World Bank and JICA (Japan International Cooperation Agency), KOSGEB launched the "Rapid Support Programme for Micro and Small SMEs" to help preserve pre-Covid employment levels. The facility provides TRY 100 thousand (TRY 110 thousand if employee or employer is female) per employee per year, and it is limited with 2 persons for micro-SMEs and 5 persons for small SMEs. It is in the form of a 4-year interest-free credit with an initial two-year grace period. As of August 2022, a total of about $335 million has been allocated to more than 52,000 SMEs. This volume is expected to reach $450 million by yearend.

There were also private sector initiatives to support businesses during the pandemic:

- In October 2020, the Banks Association of Turkiye launched a credit package of TRY 10 billion (~€1.25 billion) for companies in the tourism sector and a separate package of the same size for SMEs, both with easy payment terms.
- Throughout the year 2020, several international institutions such as the Islamic Development Bank ($370 million), the Asian Infrastructure Development Bank ($500 million) and the EBRD (€50 million) arranged sizeable credit lines largely to support SMEs in Turkiye. The lines were processed through the Turk Eximbank and some development banks in Turkiye.

These support measures seem to have helped in preventing a sudden economic downturn and the Turkish economy achieved a GDP growth of 1.8% in 2020, a year in which most other economies in the world showed negative growth rates. However, all the measures mentioned above are short-term measures specifically targeting to mitigate the immediate economic impact of the Covid-19 crisis. None are designed for structural changes in the long run. Notwithstanding the favourable terms of new credits, SMEs are more indebted after the pandemic than they were before. Furthermore, final economic spill overs of the pandemic are yet to be observed. Therefore, it is necessary to explore the SME sector more closely to develop a more resilient underlying structure for the long term.

Statistical data analysis

The purpose of the data analysis is to find out if the available data on SMEs contains useful information to assess and detect early signs of financial deterioration of company. The analysis is conducted in four dimensions at the aggregate level to investigate any relation between potential financial distress and:

- Trends in standard financial indicators,
- Foreign-trade intensity,
- Company age and gender composition,
- Deterioration in reporting quality.

The analysis is carried out for "systemically important" companies, which are those companies that jointly make up most of the business volume in each industry and that are linearly interconnected on the supply chain.[23] Unless otherwise stated, the estimation period in all analyses is 2017 – 2019 and the result year is 2020, the last year for which data is available at the time of the study.

Description of databases

The following five databases, compiled and maintained by the Ministry of Industry and Technology ("the Ministry"), are used:

1. Enterprise registry ("**girisimsicil**"): This contains general and meta information on all companies in Turkiye. Some examples of data used in this analysis are year of establishment, location of headquarters, NACE (Nomenclature of Economic Activities) code for area of economic activity, ordinal identifier of size, number of employees, wages paid, and activity status.
   - There are defined 99 NACE second-level codes (industry codes) but only 88 industries have companies in the database. The full list is given in Appendix 1.
   - Size codes have four ordinal categories: "1" is for micro-SMEs, "2" for small SMEs, "3" for medium-sized SMEs, "4" is for non-SME large companies
   - In any given year, activity status is either "active" meaning the firm is live and continues to report, or "inactive" meaning the firm is dead and stopped reporting.
2. Financial statements ("**bilanco**"): This database includes detailed annual financial data of companies. There are 290 items of the balance sheet and income statement, organized at five levels of detail as: Level 1 with 18 items, level 2 with 60 items, level 3 with 98 items, level 4 with 288 items, and level 5 with all 290 items.
3. Declared purchases and sales ("**babs**"): This includes all purchase and sales transactions (which are higher than certain thresholds) between the companies in the database. This database is critical in (a) mapping the interconnections between companies on the value chain and detecting the systemically important SMEs, and (b) deriving early-warning signals about the financial health of companies which are likely to cause disruptions in the upstream and downstream of the value chain.
4. Foreign trade ("**ithalat_ihracat**"): This database contains export and import information at the firm level. This includes detailed data on country of destination and origin,

[23] The concept of "systemic importance" as used in this study was briefly defined in the introduction section and it is further explained in the final section on policy recommendations.

physical amounts, monetary values, and product codes of trade. The information in this database is viewed as complementary to "babs" and analysed as such.

5. Employee registry ("**calisan_sicil**"): This database includes detailed information on the registered employment status of every person in every company in each month, along with the employee's age, gender, and profession. This database is used to get a gender map of the SME economy.[24]

In financial reporting, privately held SMEs in Turkiye are subject to the "Turkish Accounting Standards for SMEs," which is not fully compliant with the IFRS in all aspects. However, by construction, all databases are compliant with international coding and classification standards, and hence they are fully mutually compatible.

Analysis of financial indicators

The algorithm in this section uses data on all reporting firms in years 2017 – 2020. It proceeds in three steps:

- Finding systemically important SMEs for each industry, based on sales and purchase transactions,
- Observing their aggregate financial performance through the 3-year period,
- Investigating differences between the financial performance of firms which were still active in 2020 and which turned inactive in 2020.[25]

In the first step to identify the systemically important companies, all purchase and sale transactions between all pairs of companies in 2019 are first filtered out of the ***babs*** database. The filtering is done in line with the following rules:

[1] In transactions between each pair of companies, one company represents the purchase side of the transaction while the other represents the sales side.

[2] As there may be multiple transactions between a pair of companies in a certain year, all transactions are aggregated into a single record for each pair of companies.

[3] The dataset is left-joined with the ***girisimsicil*** database so that industry code and size code information are also combined

[4] The combined dataset is then processed on the industry level two times:
   - Based on the industry codes of purchasing companies
   - Then based on the industry codes of selling companies

[5] For each set of purchasing companies in a certain industry, the selling companies are sorted in descending order of sales volume. The top companies that make up 50 percent of all the sales to those purchasing companies are filtered. This filtering is repeated for all industry codes of purchasing companies to get the list of systemically important selling companies.

[6] As some companies may appear in the filtered set of more than one industry code, all systemically important selling companies for each industry of purchasing companies are combined into a single set and made unique based on company code, industry code and size code.

[24] Self-employed people without affiliation with any company or unregistered employees are not included in this database.

[25] Although the firm-specific reasons for becoming inactive are not publicly available, they are kept at the Ministry of Finance. Based on verbal communication with the Ministry experts, inactive status is almost always tantamount to insolvency.

[7] To obtain the systemically important purchasing companies, the purchasing and selling company sides are swapped, and steps [5] and [6] are repeated.

[8] Since a given company may appear in either the purchasing or selling company lists or both two lists, the two lists are combined, and company codes are made unique, to use in the second step of the algorithm.

For the selected set of companies, financial information for years 2017 through 2020 are queried from the ***bilanco*** database. Eight financial ratios are calculated for all companies for all years:

- Asset turnover: Net sales / Total assets
- Current ratio: Current assets / Short-term liabilities
- Debt to assets: (Short-term liabilities + Long-term liabilities) / Total assets
- Net financial debt to assets: (Short-term financial debt + Long-term financial debt - Cash & marketable securities) / Total assets
- Net margin: Net profit / Net Sales
- Return on Assets (RoA): Operating profit / Total assets
- Return on Equity (RoE): Net profit / Shareholders' equity
- Short-term Debt to Assets: Short-term Liabilities / Total assets

After unique values for each company and year are calculated, these figures are aggregated by calculating the median values[26] across each pairwise combination of categories: (1) NACE2 industry code, (2) Size code, (3) Year, and (4) Activity status in year 2020. The raw data is further processed so that the differences between the median values of the active and inactive groups for all financial ratios across identical categories can be calculated.

The filtered set of companies is further cleansed of the few companies with meaningless or incorrectly entered financial data such as negative total assets or similar. Industries with no or too few companies to calculate a sample median are also left out. The remaining net number of SMEs is 58,163 in 60 different NACE2 industries. The distribution of companies across active/inactive/missing status in 2020 and across size levels is provided in Table 7.[27] (Those companies did not appear in the 2020 data of the *girisimsicil* database as either active or inactive are classified as "missing" and they are reported for the sake of completeness.)

Table 7: Numbers of SMEs in the financial analysis sample

Size	Missing	Active	Inactive	Total	Inactive / Active
Micro	1,117	4,700	489	6,306	10.4%
Small and medium-sized	724	48,571	2,562	51,857	5.3%
Total	1,841	53,271	3,051	58,163	5.8%

[26] The median value is used as the aggregation function since the sample mean is prone to be distorted due to extreme outlier values, which is often the case here.

[27] Since there is a narrow maximum limit for the data that can be transferred out, the data had to be compacted. The four-level size code in the ***girisimsicil*** database was reduced to three levels by combining level 2 (small) and level 3 (medium-sized) company sizes into a new category called "small and medium-sized" hereafter.

To get a glimpse of the data used in the study, it may be useful to look at two snapshot examples given in Appendix 2. The data is big and naturally sparse in some categories. Sparsity is due to the large number of micro enterprises often with minimal reporting, lack of reasonable company clusters in "marginal" industries, and sometimes careless reporting. Since micro-SMEs are not analysed and sparse industries are disregarded, the first two reasons are not critical for this study. Reporting quality will be investigated later.

Since the goal of this analysis is to provide for an algorithm-based model that can detect [at the early stages] companies which are facing financial distress. A simple measure is devised in two ways:

- The medians of the financial ratios of companies across all industries are calculated for years 2017 – 2019. Then, the differences between the median financial ratios of companies that turned inactive in 2020 and those of companies still active in 2020 are calculated (inactive's median minus active's median). The medians of these differences for each ratio and year are reported.
- Across all industries, the percent of cases where the median financial ratio figures for company categories that are inactive in 2020 are above the similar figure for companies that are active in 2020 are calculated for each ratio.

The two figures are closely related. If the percent of cases for a ratio where the figure for inactive companies is above that of active companies is larger (smaller) than 50%, than the median of differences will be above (below) zero. While the median difference shows the scale of this difference, the percent of cases shows how persistent that pattern is across different industries. This can be interpreted as a basis for the significance of the inclination of differences in a certain direction. A summary of median differences for the small and medium-sized SMEs, which is the major focus of the study, is provided in Table 8.

Table 8: Differences between median financial ratios of active and inactive SMEs

Ratio	2017	2018	2019
Asset Turnover	-0.042	0.000	0.120
Current Ratio	0.008	-0.066	-0.081
Debt / Assets	0.021	0.044	0.051
Net Financial Debt / Assets	-0.010	-0.003	-0.002
Net Margin	0.001	-0.002	-0.001
RoA	0.002	-0.006	-0.003
RoE	0.016	0.012	0.042
St Debt / Assets	0.031	0.072	0.078

Especially in the last year before the "active" or "inactive" classification occurs (namely, 2019), for companies that become inactive in 2020:

- Asset turnover is higher
- Current ratio is lower

- Total debt to assets and short-term debt to assets are higher
- Net financial debt to assets is lower
- Net margin and return on assets are lower
- Return on equity is higher

This assessment is reconfirmed with the percent of cases above zero in Table 9. To interpret the numbers in the table, for example, 69% of the asset turnover ratios in 2019 for inactive companies in 2020 across all 60 industries are above those of the active companies. Note that the percent of cases of 69% being greater than 50% agrees with the median difference of 0.12 being above zero. The same interpretation applies to all ratios.

Table 9: Percent of companies with positive median differences

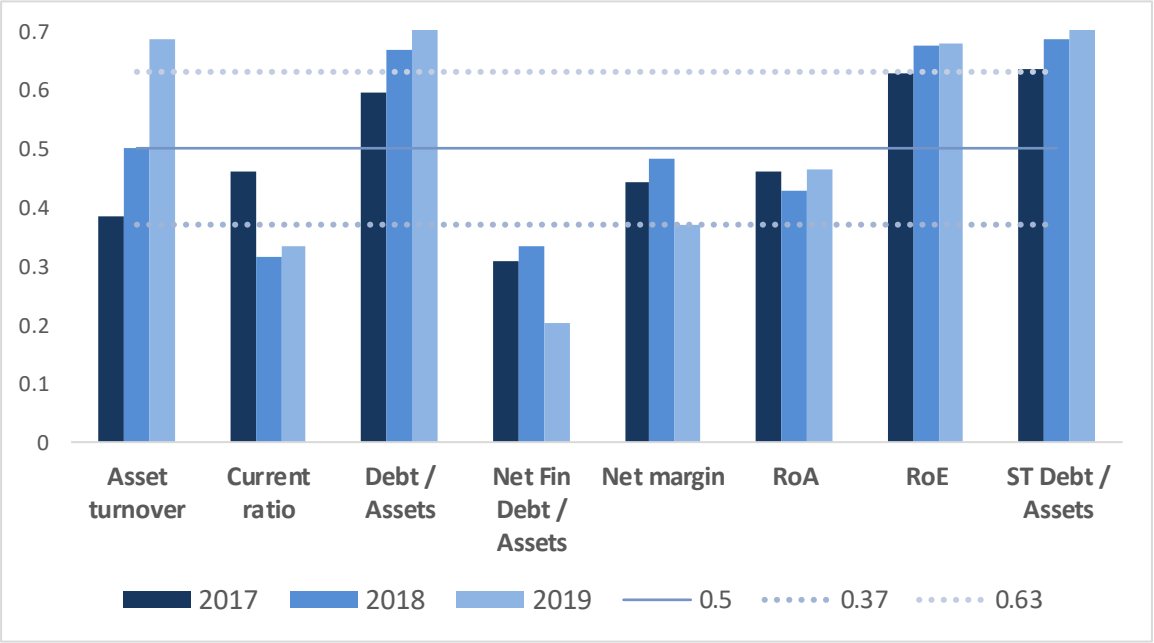
Ratio	2017	2018	2019
Asset Turnover	0.38	0.50	0.69
Current Ratio	0.46	0.31	0.33
Debt / Assets	0.60	0.67	0.70
Net Financial Debt / Assets	0.31	0.33	0.20
Net Margin	0.44	0.48	0.37
RoA	0.46	0.43	0.46
RoE	0.63	0.67	0.68
St Debt / Assets	0.63	0.69	0.70

To assess the statistical significance of the findings, a confidence interval with a 5-percent probability of error is estimated as [0.37, 0.63] around 0.50.[28] The data in Table 9 is shown visually in Figure 8, where the upper and lower confidence limits are also drawn.

Except the return-on-assets ratio, percent of cases for all other ratios in 2019 are significant. Note that in 2017, three years before the determination of active and inactive companies, the percent above zero levels across financial ratios are closer to 0.5 mostly within the confidence interval except for significantly low net financial debt to assets and high short-term debt to assets. By 2019, most percent values diverge from 0.5 beyond the margins of the confidence interval. So, early signs of potential distress start in 2017 but they become most evident one year before the actual failure in 2020.

[28] This is a crude test. It is based on observed sample sizes between 51 and 54, the construct of a binomial distribution, a prior belief that the expected percent of cases above zero is symmetric around 50%. Then, the probability to have a percent of cases above zero smaller than 37% is around 2.5%. So, a confidence interval of [0.37, 0.63] agrees with a two-sided type-I error of 5%.

Figure 8: Percent of companies with positive median differences



To arrive at an integrated anatomy of the companies that are highly probable to become inactive soon, the findings can be interpreted as in the following scenarios:

- The companies that are becoming illiquid are not able to generate working capital, and hence have lower current ratios.
- They cannot strengthen or retain shareholders' equity, possibly due to high dividend pay-out ratios (or "similar" distributions to shareholders)
- Low working capital and weak shareholders' equity result in an illusion that the asset turnover ratio and return on equity are high.
- Financial institutions foresee increasing risks and decline to provide financial debt to companies, hence lower net financial debt to assets.
- With deteriorating equity and lack of external financial funding, the funding gap is closed with increasing non-financial debt, possibly borrowing from non-financial firms and individuals, and increasing accounts payables.

Analysis of foreign trade intensities

The purpose of this section is to investigate whether share of foreign trade in companies' trading activity effects financial performance and hence conveys useful signals in predicting potential insolvency. The algorithm in this section uses data on all reporting firms in 2019 – 2020. It proceeds in three steps:

- Finding the more important export-intensive and import-intensive companies for each industry,
- Calculating the eight financial ratios aggregated on the industry level and across different levels of export and import intensity
- Investigating differences between the financial performance of firms which were still active in 2020 and which turned inactive in 2020.

The algorithm here proceeds the same as in the previous section:

[1] Using the ***ithalat_ihracat*** database, filter out and aggregate 2019 exports at the company level
[2] Left join the data set with the *girisimsicil* database so that industry code and size code information are also combined
[3] For each NACE2 code, sort the companies by size of exports in decreasing order
[4] Filter the companies that cumulatively make up 75% of the exports of each industry and thus obtain the set of important exporters across all industries
[5] Using import data, repeat the four steps above and filter out the set of important importers across all industries

For the selected set of companies, financial information for 2019 are queried from the *bilanco* database and the same eight financial ratios used in the previous step are calculated for all companies. Additionally, for each company:

- Export-intensity ratio is calculated as the ratio of exports to total net sales
- Import-intensity ratio is calculated as the ratio of imports to total net purchases (the sum cost of goods sold and increase in inventories)

The continuous intensity feature is then discretized into four ordinal levels of intensity: Level 1 for companies with intensity ratios below 25%, Level 2 for intensity ratios between 25% and 50%, Level 3 for intensity ratios between 50% and 75%, and Level 4 is for companies with ratios above 75%. Level 1 implies low intensity, levels 2 and 3 imply medium intensity, and level 4 stands for high intensity of exports (imports).

Like in the previous section, the medians of the eight financial ratios are aggregated across industries, years, company size levels, and active vs inactive status in 2020. Here, the median ratios are also aggregated across levels of export-intensity and levels of import-intensity.

After further cleaning of the data, the number of companies that make up 75% of foreign trade across all industries are 4,753 exporting and 2,701 importing companies.[29] Detailed breakdown across size levels and active/inactive status in 2020 are provided in Table 10.

Table 10: Numbers of SMEs in the foreign trade analysis samples

Size	Trade	Missing	Active	Inactive	Total
Micro	Export	24	115	13	152
	Import	13	69	3	85
Small and medium-sized	Export	13	2,112	93	2,218
	Import	7	557	33	597
Large	Export	17	2,282	84	2,383
	Import	21	1,918	80	2,019
Total	Export	54	4,509	190	4,753
	Import	41	2,544	116	2,701

[29] The actual numbers of companies are slightly higher than these numbers. The Ministry requires that any cluster with less than three companies must be masked to prevent reverse engineering to reveal company names. In this part with smaller data, some aggregate figures failed to pass the minimum company count filter and hence they had to be left out.

Export-intensity

As data is aggregated multiple times, the filtered data of aggregated financial ratios turns out be sparse across industries and export-intensity levels. Therefore, the percent-above-zero analysis here is modified as:

[1] The 2019 financial figures for the small and medium-sized companies that are still active in 2020 are filtered

[2] Then, those industries that have meaningful aggregated financial measures for at least two export-intensity levels are filtered. (Note that these intensity levels may be any two of the originally defined four levels and differ across industries.)

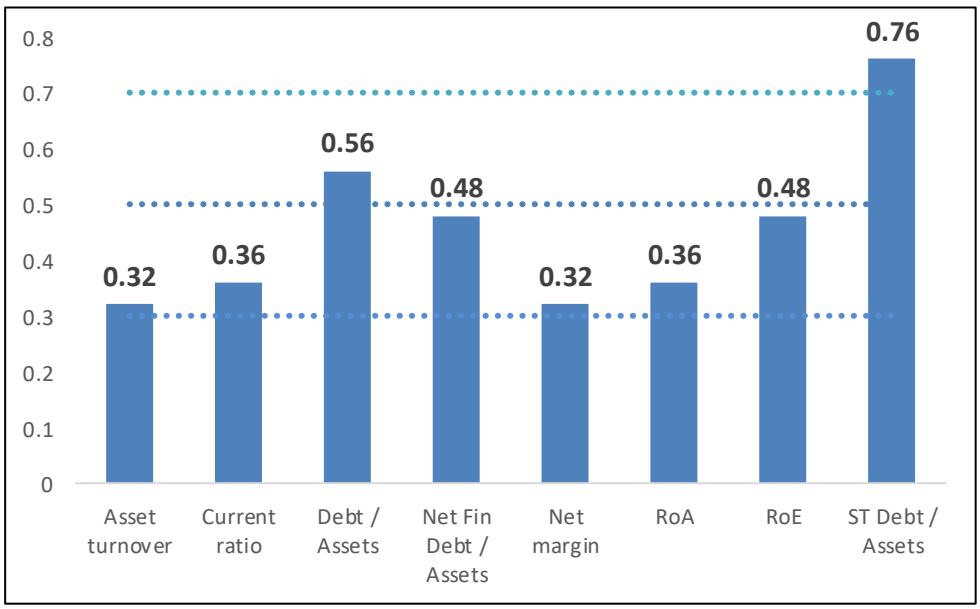
[3] For each of the eight financial ratios, the difference between the highest and the lowest non-missing export-intensity level of each industry is calculated

[4] For each financial measure, the percent of industries that have a difference above zero is calculated

The findings are shown in Figure 9, where a 5-percent confidence interval around a binomial expected value of 0.5 is also shown. As the percent-above-zero figures are mostly within the confidence interval, the results are not formally statistically significant. However, they agree with the overall picture of financial performance found in the previous section, and hence they are not meaningless. In general, firms with higher export-intensity levels seem to have:

- Above average levels of debt, especially short-term debt, and below average levels of net debt – indicating a possible problem of external funding as exports increase,
- Lower asset turnovers despite also lower current ratios – indicating insufficient working capital and difficulty in expanding sales amidst fierce international competition,
- Lower net margins and lower return on assets, which are likely the results of lower asset turnovers.

Figure 9: Percent of industries with positive differences in financial ratios between high and low export-intensity companies



These figures reflect the financial performance of SMEs as direct exporters. However, in the commercial practice of Turkish companies, SMEs may also export indirectly through specialized wholesale exporters, which are typically non-SME large companies classified under NACE2 46. To get a somewhat clearer picture, it may be useful to investigate their financial performances as well. The 2019 median financial ratios for these large export companies, that are still active in 2020, are tabulated across export-intensity levels in Table 11.

The financial performance of large exporters is like that of the SME exporters in some ways. As export-intensity increases, companies display

- Lower current ratios, showing working capital shortages, but higher asset turnover, which is partly due to low working capital and possibly more competitive power in international markets,
- Lower return of assets and lower net margin, again due to inadequate equity,
- Higher levels of debt, especially short-term debt, and insignificant levels of net financial debt.

Table 11: Financial ratios of larger exporters at different export-intensity levels

	Export-intensity level		
Ratio	Low (level 1)	Medium (level 3)	High (level 4)
Asset turnover	1.59	1.54	2.01
Current ratio	1.38	1.24	1.11
Debt / Assets	0.71	0.83	0.9
Net Financial Debt / Assets	0.01	0.01	0.01
Net margin	0.01	0.06	-0.01
RoA	0.08	0.05	0.03
RoE	0.11	0.13	0.15
ST Debt / Assets	0.59	0.69	0.84

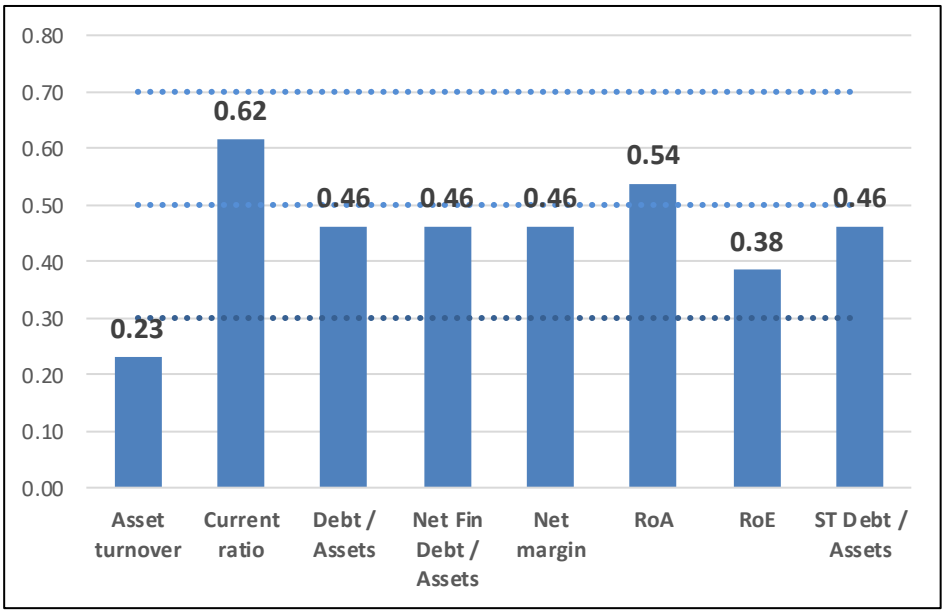
Import-intensity

The same analysis is repeated here using import data, first for small and medium-sized SMEs as direct importers and then for large wholesale companies as indirect importers. For all eight financial ratios, the difference between the highest and the lowest non-missing import-intensity level of each industry is calculated. For each financial ratio, the percent of industries that have a difference above zero is calculated and they are plotted in Figure 10.

Compared to export-intensive SMEs, a markedly different picture emerges for import-intensive companies. Firms with higher import-intensity levels seem to have

- Lower levels of short-term, long-term debt and net financial debt,
- Higher current ratios and return on assets,
- Lower net margins and lower asset turnovers.

Figure 10: Percent of industries with positive differences in financial ratios between high and low import-intensity companies



The performance of large wholesale importers also mostly confirms these results. They are summarized in Table 12.

Table 12: Financial ratios of larger importers in different import-intensity levels

	Intensity level		
Ratio	Low (level 2)	Medium (level 3)	High (level 4)
Asset turnover	2.14	1.76	1.53
Current ratio	1.40	1.59	2.36
Debt / Assets	0.72	0.68	0.48
Net Financial Debt / Assets	0.01	0.02	0.03
Net margin	0.06	-0.01	-0.10
RoA	0.08	0.11	0.09
RoE	0.12	0.14	0.13
ST Debt / Assets	0.60	0.54	0.35

When all findings are put together, it seems that importers have better financial performance than exporters, both at the SME level and the large company level. Probability of insolvency appears to be smaller for import-intensive firms than for export-intensive firms. Some reasons

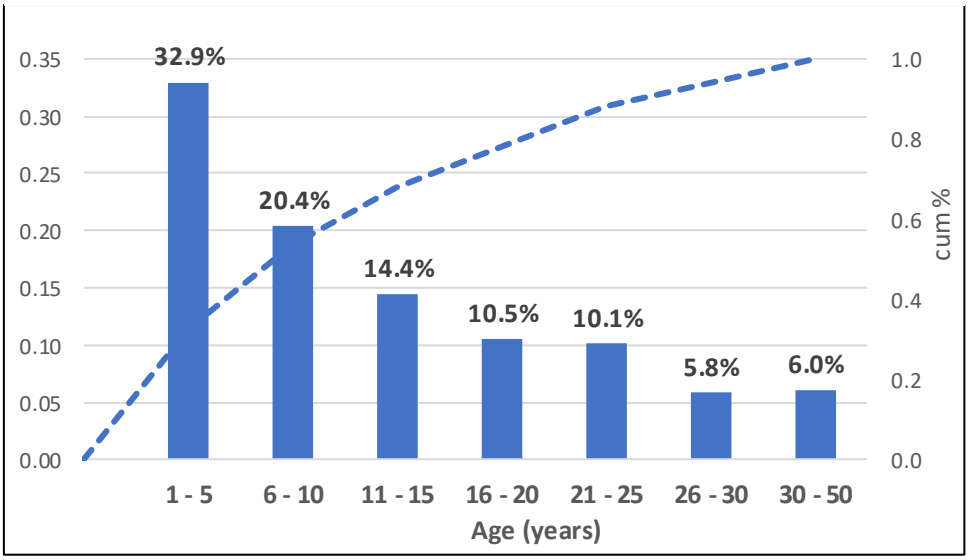
for this were mentioned in the above sections but they are not statistically strong arguments. The only certainty is that foreign trade intensity has a visible effect on financial performance.

Due to the insufficiency of the exporter and importer sample data, the available financial measures aggregated across several dimensions are sparse, making it harder to arrive at significant and strong inferences. Using the insights from this preliminary analysis, a more thorough analysis at the micro level must be conducted in follow-up studies.

Company age and financial performance

Out of 3.2 million companies active in 2019, the age distribution of 3.1 million companies with an age equal to or smaller than 50 is shown in Figure 12. Age is calculated as the numerical difference between 2020 – the year active/non-active distinction is made - and the year of establishment as reported in the "girisim_sicil" database. The median age is around 10 years, and the mean age is 12 years. Nearly half of all companies are younger than 10 years and about 12% are older than 25 years.

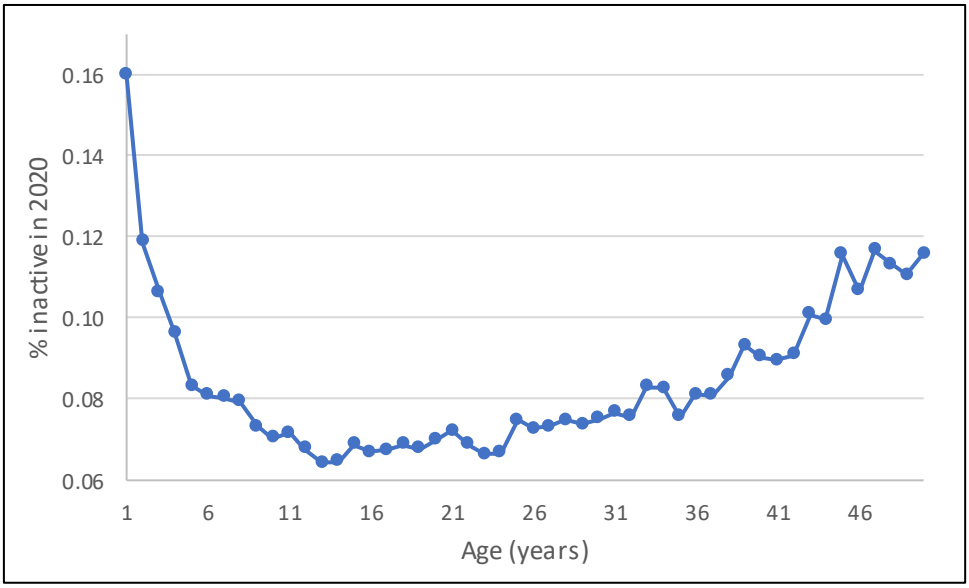
Figure 11: Age distribution of SMEs



The percent of companies going inactive in 2020 ("hazard rate")[30] across ages seems to show a U-shaped behaviour as shown in Figure 13. The share of companies going inactive is at a maximum of 16% in the first year, rapidly declines to a minimum of 6% at age 13, stays below 8% until 30 years of age, and gradually increases to 11% at ages forty-five and higher. The probability of going out of business is highest for youngest companies (mostly micro-SMEs younger than 3 years), lowest for companies between the ages of 5 to 30 years, and higher for companies older than 35 to 40 years. These findings are in line with the textbook-style description of company life cycles.

[30] This hazard rate is the ratio of the number of companies turning inactive in 2020 to the sum of all companies in 2020. Companies active in 2019 but missing in 2020 are not included.

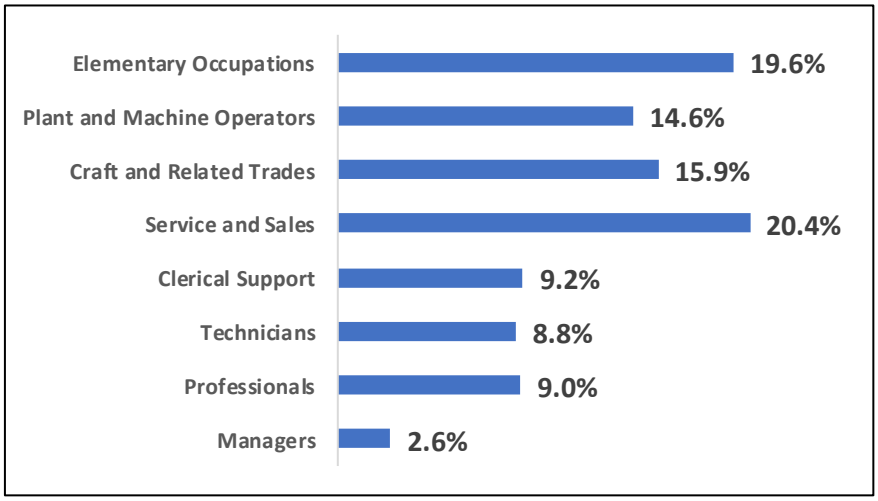
Figure 12: Relation between company age and insolvency



Gender distribution and financial performance

Gender and profession data of employees is obtained from the "calisan_sicil" database fed by company reports to the Social Security Institution, and it covers 14.7 million people in 2019. The profession codes follow the ISCO-08 (International Standard Classification of Occupations) standards set by the International Labour Organization. This data does not include unregistered employees, and people who have already retired from the social security system. A summarized distribution of professions is given in Figure 13.

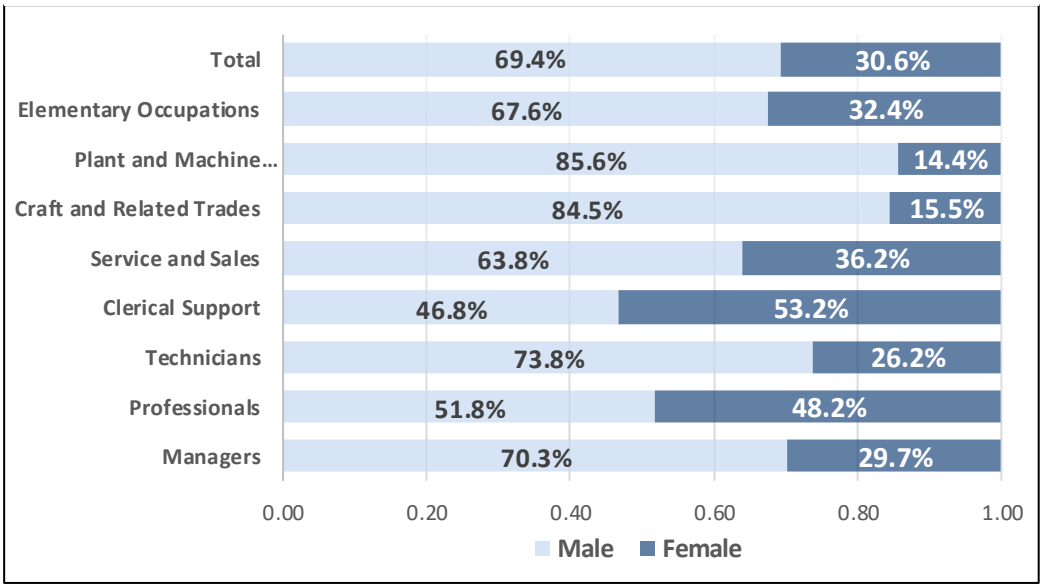
Figure 13: Distribution of professions of SME employees



Women constitute 30.6 % of the total employment by companies (excluding self-employed with no company affiliation). The disproportionate share of women is mostly a result of the low workforce participation rate of women. Gender distribution across professions is depicted in Figure 15. Women employment share is at a maximum in "clerical support workers" with

53.2 % and at a minimum in “plant and machine operators” with 14.4 %. Shares of 48.2% in professional and 29.7% in managerial positions are noteworthy.

Figure 14: Gender distribution in different professions



The performance of companies at various levels of women’s share in critical employments are compared. Presuming that the employees in the “managers” and “professionals” classification of ISCO-08 would be most critical in company performance, these data are filtered. For companies with at least one employee in these two categories in 2019, the share of female employees is calculated. The share is then discretized into four ordinal categories where 1 is for women’s share below 0.25, 2 for women’s share between 0.25 and 0.50, 3 for women’s share between 0.50 - 0.75 and 4 stands for women’s share above 0.75. These measure the intensity level of women’s share.

The analysis is done for small and medium-sized SMEs. As in the previous sections, the algorithm proceeds as:

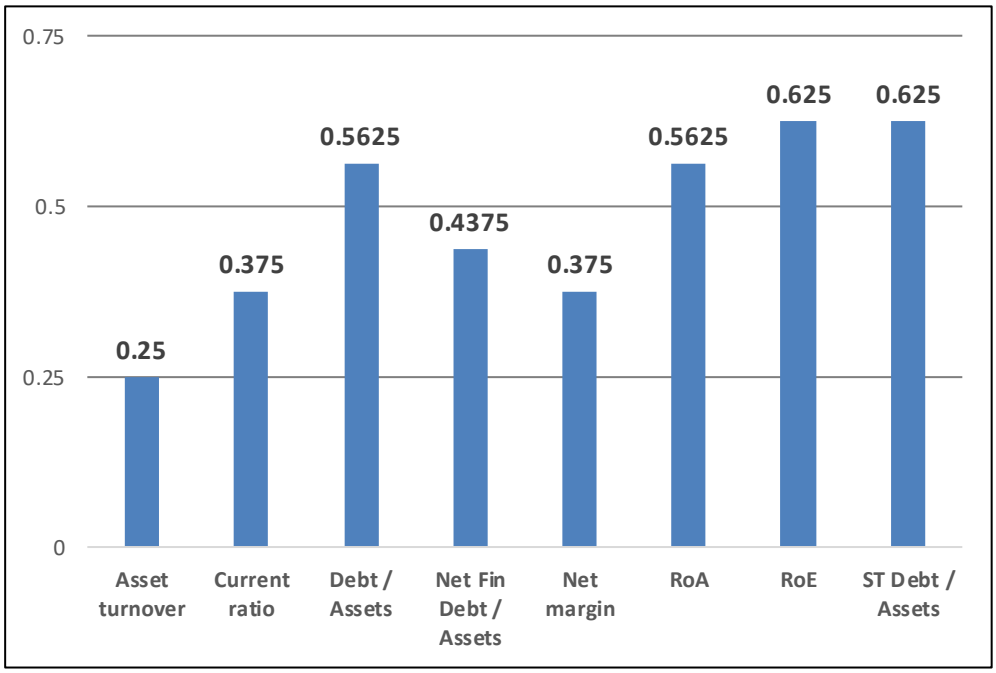
[1] Industries that have meaningful aggregated financial ratios for at least two intensity levels are filtered. These may differ across industries.

[2] For each of the eight financial measures, the difference between the financial ratios of the largest women’s share level 4 and the smallest women’s share level 1 of each industry code is calculated

[3] For each financial measure, the percent of industries that have a difference above zero is calculated

The percent above zero value for each financial measure is presented in Figure 16. While the return on equity, return on assets and short-term debt to assets and total debt to assets measures are above 0.5 and net margin, current ratio, net financial debt to assets and asset turnover measures are below 0.5, all measures are within the 0.25 - 0.75 confidence interval as calculated for the sample size of sixteen industries with meaningful figures.

Figure 15: Gender distribution and financial performance



It can be concluded that, gender composition of critical positions in companies does not seem to constitute a significant difference in financial performance. This may be interpreted as supporting the argument of gender equality.

Company reports and financial performance

This section explores the linkage between missing or less granular financial information as reported by companies and the risk of potential insolvency. The hypothesis is that, when companies are under financial distress, they may be reluctant to report in detail, either to hide information from outside parties or because disclosure may be thought of as an unnecessary burden in troubled times. Therefore, a decreasing trend in the number of items reported may be a signal of upcoming financial problems.

The number of reported items is minimal in the first and second levels of detail. For example, level 1 only includes only two balance sheet items: total assets, and total liabilities. Level 2 has an additional five items: current and fixed assets along with short-term liabilities, long-term liabilities, and equity. Since these are the integral parts of any financial report, the idea of missing information is better explored for items at the third and fourth levels of detail.

A two-dimensional analysis is done for the third level items, across number of items and across changes in the number of items. The number of items dimension is further explored for the fourth level items. The algorithm proceeds as:

[1] Small and medium-sized SMEs that are active both in 2017 and 2019 are filtered and they are joined with their inactive / active status in 2020.
[2] To leave out cases of no reporting, only those financial statement with meaningful and positive total assets value are filtered.
[3] For reporting firms, number of non-zero third level items in 2017 and 2019 is counted.

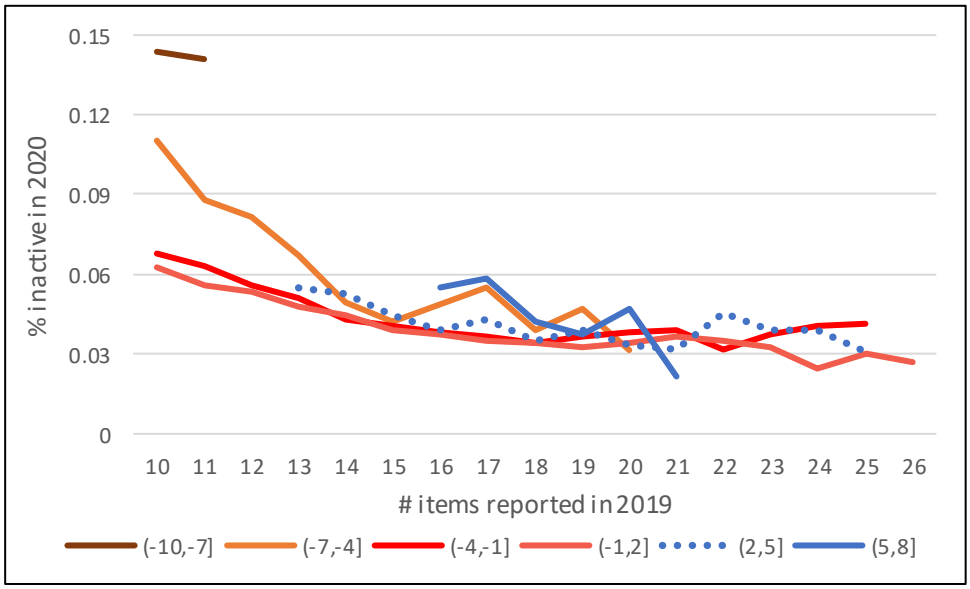
[4] In a separate table for the same companies, number of non-zero fourth level items in 2019 is counted.

For the third level items, percentage of firms turning inactive in 2020 is calculated across two dimensions: Number of items in 2019 and change in number of items from 2017 and 2019. Since there are five second-level items in a balance sheet, and since the existence of the third level implies at least two items per each second-level item, the records with fewer than ten third-level items are treated as missing information at the database level - a possible failure to import all financial information - and hence they are filtered out. Categories with fewer than 200 companies are also filtered out since small samples can distort the overall picture.

Controlling for changes in number of items, the findings are shown as graphs in Figure 16. Each different line colour in the graph represents the range of changes in the number of reported items from 2017 to 2019. For example, the orange line is for companies that reported four to seven fewer items in 2019 than in 2017.

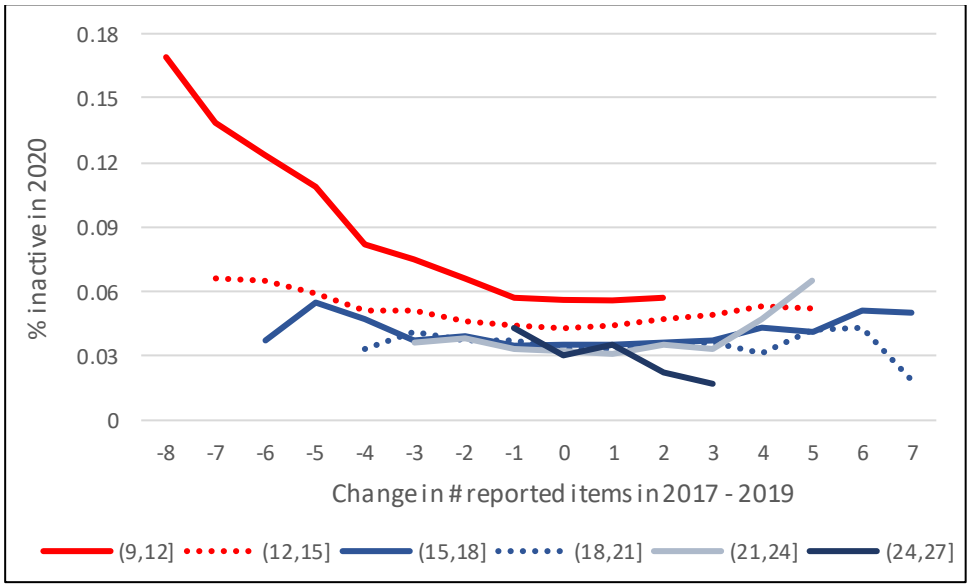
It is clearly visible that the percentage of companies going inactive in 2020 increases when fewer items are reported in 2019. This trend continues until the number of items reported in 2019 reach around 18 – 20, a level at which larger number of reported items does not convey a significant signal about insolvency risk.

Figure 16: Relation between insolvency and number of reported items



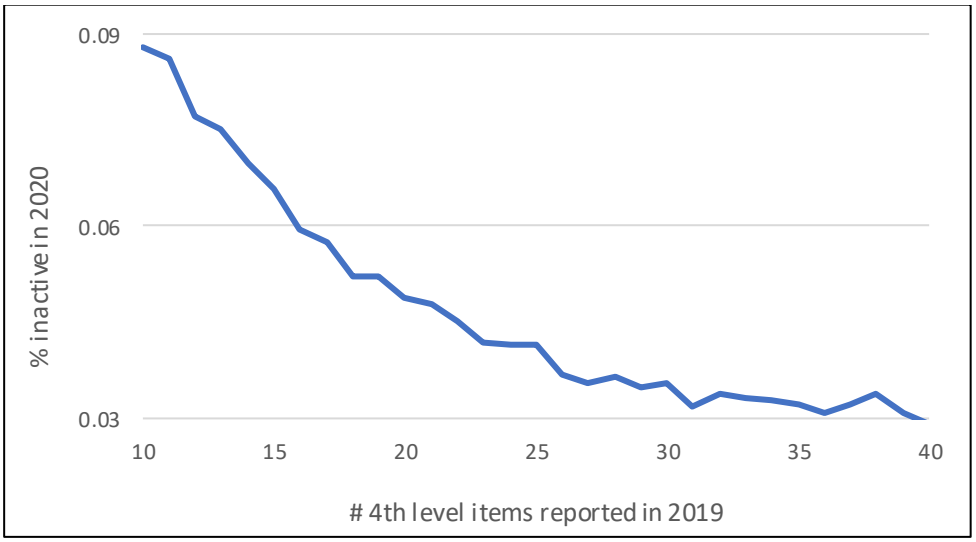
The analysis is repeated by swapping the dimensions, so the number of third-level items in 2019 becomes the controlling variable separating the lines. In Figure 17, each different line colour represents the number of items reported in 2019. When the trends in the lines are examined, it is seen that a decrease in the number of items from 2017 to 2019 signals higher insolvency risk. On the other hand, the flat behaviour of the lines to the right of zero on the horizontal axis means that an increase in the number of items from 2017 to 2019 does not necessarily imply reduced risk of insolvency in 2020.

Figure 17: Relation between insolvency and change in the number of reported items



To strengthen the findings, Figure 18 shows the relation between insolvency in 2020 and the number of fourth level items reported in 2019:

Figure 18: Insolvency and level of detail in reported items



Although change in number of items could not be controlled for (due to the remarkably high number of pairs for 2017 and 2019 number of items), the fourth level item numbers also confirm the analysis done with third level items. The risk of insolvency decreases, and it is more than halved monotonically up to around forty fourth-level items reported in 2019, after which percentage of inactive firms oscillates with a still downward trend. These findings evince the fact that quality and amount of reported information ("transparency") have much to do with SMEs' financial health.

Policy recommendations

Within the scope of the study, this section presents some high-level recommendations on public policy for SMEs in Turkiye. They are based on the factual economic picture as described in the first section, the empirical findings in the second section on statistical analysis, and extensive discussions with government officials and businesspeople on the subject.

General recommendations

For thematic comparability with similar studies in other countries, the framework suggested by the OECD's Council on SME and Entrepreneurship Policy (OECD, Recommendation of the Council on SME and Entrepreneurship Policy, 2022) is used to the extent relevant. OECD puts forward three major recommendations:

1. Coordinated and coherent policy design and implementation
2. Facilitate the development and enhance the resilience of SMEs
3. Enhance SMEs' access to financial resources and business networks

In light of these recommendations and focusing on the current role of KOSGEB in the institutional structure of decision making and policy design for SMEs in Turkiye, several areas may be considered for further evaluation and improvement:

1. **There do not seem to be any major issues in KOSGEB's coordination with other parties in the decision-making process about SME support policies.** KOSGEB is an extension of the Ministry of Industry and Technology and hence they are integrated in decision making. KOSGEB is also often involved in relevant joint committees with other ministries and institutions. In general, it is observed that KOSGEB is regularly engaged in policy decisions about support programmes for SMEs. As explained in the first section of the report, these are the support programmes in technology, entrepreneurship, and development, all of which are financed within KOSGEB's own budget and directly implemented by KOSGEB.

   On the other hand, there are issues regarding coordination in the implementation of financial support programmes for SMEs. In most cases, the amount and allocation channels of SME credits as per governmental support is decided by the Ministry of Treasury and Finance, and executed via a state bank or via banks under the guarantee of the Credit Guarantee Fund (KGF).[31] The process of providing financial support to SMEs develops through the usual credit evaluation by banks on a case-by-case basis. This may result in suboptimal and unintended (vis-a-vis policy targets) allocation of credit as credit decisions are often not based on any consideration of strategic or systemic importance of candidate SMEs.[32] Moreover, one-size-fits-all type of credit support policies may fail to consider the diversity of SMEs in several aspects. **It is therefore recommended that KOSGEB should be tasked to identify the subsets of SMEs that are most suitable for credit support within the intended framework of government's policy targets.**[33] If deemed necessary, KOSGEB's current resources may be increased for this purpose, or this task can be carried out jointly with the KGF. In other words, KOSGEB should be positioned to be the first-step filter before banks and other financial institutions are involved in the

[31] The only role for KOSGEB in this process is the SME certification of applicants, which is sometimes bypassed when banks check for SME eligibility on their own.
[32] Sometimes, government credit policy may target a specific sector (such as exporters) or a specific issue (such as gender equality). However, even in these cases, resulting allocation of credit may still be suboptimal.
[33] A similar filtering of SMEs is also recommended in cases such as the previously mentioned World Bank – JICA credit, which is directly allocated by KOSGEB itself.

process. This filtering should be based primarily on data, and it should be designed very carefully not to interfere with credit decisions and pricing at the creditor or financier level.

Coherence is necessary not only among policies and institutions, but long-term policy effectiveness also calls for intertemporal coherence and continuity. Currently, KOSGEB uses several mechanisms to monitor and evaluate support policies for their final impact on SMEs' performance. These are also used when an evaluation is needed for a new demand by a previous recipient of support, or when an existing support programme is to be offered for a second round. Along similar lines, OECD proposes evidence-based methodologies to assess systematically the effectiveness of current and past policies, and use the findings as inputs in the design of new policies. As a simple case in point, it would be useful to compare the performance of recipients of a given support with that of non-recipients during a subsequent time interval.

2. As detailed in the "KOSGEB Strategic Plan 2019-2023" (KOSGEB, 2019), KOSGEB has several support programmes in areas such as increasing productivity and competitiveness of SMEs, innovation, digitalization, sustainability, research and development, capacity building, and promoting entrepreneurship. Most of these programmes are implemented successfully. During the pandemic, KOSGEB has also moved most of its information exchange with SMEs to digital platforms. However, the outreach of these programmes is constrained by KOSGEB's limited budget. During the period between January 2019 and August 2022, the total amount that could have been allocated for these purposes was less than €300 million per year. This sum is not enough to achieve a long-term impact. Therefore, it is strongly recommended that KOSGEB's budget should be increased significantly.

   Regarding the need to enhance the resilience of SMEs, there seems to be much work to be done including within the legislative field. As mentioned several times in the report, the insolvency regime in Turkiye is not friendly to business. One out of the two judicial reorganisation procedures, aimed at the rescue of viable but financially distressed businesses, the procedure of restructuring upon settlement is not used in practice. This is possibly due to the lack of availability of an automatic moratorium upon application to the court. In comparison, the concordat procedure benefits from an automatic moratorium and is used by smaller businesses but these proceedings are often too lengthy because the moratorium can be extended up to a total duration of two and a half years.[34] This is even more common for SMEs and particularly micro-SMEs. Once an SME falls into financial distress and signals insolvency, it is often almost impossible to successfully reorganize the business and avoid liquidation.

   Businesses can also benefit from temporary statutory frameworks for financial restructuring which sit alongside the existing concordat procedure. However, this is very much bank focused. The existing Turkish Banking Association's small-scale Framework Agreement covers debtors with relatively low degrees of exposure (of up to smaller companies with exposures under TRY 25 million) but it cannot be considered as a permanent piece of legislation and the scope of applicability is restricted. Even though SMEs' main line of credit is bank debt, they often have exposures towards third parties and vendors that can be critical for their survival. It is necessary, therefore, that an efficient insolvency regime is put in place to differentiate between viable and unviable companies and provide those viable businesses with the best opportunities to restructure

[34] The Directive (EU) 2019/1023 on preventive restructuring frameworks envisages a maximum four-month initial moratorium which may be extended up to 12 months in total.

their debts and business and be able to continue as a going concern. There is an urgent need to reform the insolvency regime in accordance with the recent policy recommendations and general accepted principles of the EBRD, World Bank, United Nations and the European Commission on SMEs in general and micro enterprises in particular.

Simplification and expediency of insolvency proceedings for MS(M)Es are at the heart of the EBRD Core Insolvency Principles (EBRD, 2020), the World Bank's Principles for Effective Insolvency and Creditor/Debtor Regimes (World Bank, 2021) and the work of the United Nations Committee for International Trade Law (UNCITRAL) as discussed before. In 2021, UNCITRAL Working Group V recommended to expedite MSE liquidations and assist viable cases to reach a restructuring solution. Recommendation no 4 states: "*States should ensure that a simplified insolvency regime provides for simplified liquidation and simplified reorganisation*".

Part Five of the UNCITRAL Legislative Guide on Insolvency Law sets out guidance on the framework for a simplified insolvency regime for MSE and individual entrepreneurs, including both reorganisation and liquidation. A simplified regime should ensure expediency, simplicity, flexibility and the low cost of proceedings. Section D of part 5 lists the main features of a simplified reorganisation regime:

i) the existence of default procedures for the parties to navigate more easily any available and suitable options,
ii) short time periods for the procedural steps, aiming to ensure expediency,
iii) reduced formalities in relation to submissions, approvals and notifications, thereby achieving a cost-effective approach,
iv) debtor in possession as the default option. In other words, the debtor should remain in control of its assets and the day-to-day operation of its business with appropriate supervision and assistance of the competent authority,
v) limited or total removal of the debtor's management where necessary in clearly defined circumstances,
vi) the presumption of the need for creditors' approval for certain matters in accordance with procedures and time periods established in the insolvency law.

The UNCITRAL guidance leaves the involvement of an independent professional in the administration of a simplified insolvency procedure, as well as the choice of competent authority (and whether this should be a court) to the discretionary of each national legislator.

At EU level, the Directive (EU) 2019/1023 on preventive restructuring frameworks expressly provides in Article 8 that "*Member States shall make available online a comprehensive checklist for restructuring plans, adapted to the needs of SMEs. The checklist shall include practical guidelines on how the restructuring plan must be drafted under national law*". This provision targets reducing advisory costs for debtors and guidance on how to navigate towards a restructuring plan without the need to engage specialised advisors. An in-depth analysis by the European Parliament's Policy Department for Citizens' Rights and Constitutional Affairs at the request of the JURI Committee (European Parliament, 2017) explains the rationale behind Article 8 of the EU Directive. Member States shall use IT solutions to develop a templatised approach on mapping down the debtor's position and propose accordingly restructuring options that will be translated in a restructuring plan. Article 9 states that "*Member States may provide that debtors that are SMEs can opt not to treat affected parties in separate classes*". This provision discharges the debtors from dealing with complex procedural matters, while trying to

establish its restructuring plan. This approach combines the classification of the debtors' needs and its tailored solutions, a path also supported by the IMF in a recent note (IMF, 2021). To summarise, all international standards align towards the below recommendations in the legislative framework for SMEs:

Impediments	Recommendations
Lack of coherent definition for MSMEs	Clear provisions in the national legislation
Stigmatisation	No requirement to prove insolvency
Increased procedural costs	Templates and check lists to minimise the need for external advisory services
Lengthy procedures	Online tools to unburden courts
Lack of financial and managerial sophistication	A la carte menus based on the needs of each company, that require minimum customisation
Obstacles by creditors	Remove approval requirements and possibility for the debtor to select the affected creditors

The United States of America and Ireland were two countries that, during the Covid-19 pandemic, introduced new simplified insolvency procedures targeting specifically MSMEs, but with two different approaches. The US takes into consideration the total amount of exposures, similar to the logic followed by the Framework Agreements in Turkiye, while Ireland focuses on MSMEs and defines MSMEs based on the number of employees and turnover. The two examples are showcased in Appendix 3.

Therefore, long-term measures are needed in Turkiye, and in other countries, to address the specific needs of (M)SMEs and ensure the resilience and transition capabilities of SMEs in the country.

The path towards improving the insolvency regime in Turkiye – and any other country for that matter – requires, among others, empirical work on data, which contains information on which companies become insolvent, why they become insolvent, and on the sequential path starting with financial distress and ending with insolvency or the continuation of the business as a going concern. These should include therefore as a minimum the number of proceedings, the types of entities subject to such proceedings, the duration of the proceedings and their outcome. Other measures may be introduced with time, including data on overall recoveries of creditors and treatment of different types of creditors, secured and unsecured. Only with such data can realistic preventive models of reorganisation and restructuring be developed. This necessity is not only for SMEs but also for large companies. **Therefore, it is strongly recommended that a publicly accessible database on insolvency events is developed**. Otherwise, it is almost impossible to design an insolvency regime that prioritizes prevention before insolvency of viable companies for reasons beyond their immediate capabilities. It is also a development that would align the Turkish framework with other significant economies worldwide that regularly publish data and statistics on insolvency.

As a complementary part of any reform work on insolvency, the current practices of the asset management industry may need to be reviewed. The main aim of asset management

companies has been to unburden the balance sheet of entities with unsustainable NPL levels. As a matter of policy, the industry is also expected to attempt to deliver a second chance to companies in financial distress. When the focus is on unburdening the balance sheet of certain entities, it inevitably shifts towards debt collection. This is not a fault of the industry. Asset management companies can buy NPLs at substantial discounts (ranging from 3-10% of their nominal value) in situations where collection is not necessarily cumbersome and therefore becoming a profitable opportunity. This has in turn resulted in a problem of moral hazard, where debtors choose not to pay the bank when due in order to attempt to settle for a much smaller amount later with the asset management company, as the margins can still be profitable for the latter (and less cumbersome for the debtor). This is a dichotomy from two different sectors, financial and commercial, with two different aims. The financial sector policy should aim to preserve financial stability, whereas the commercial policy should focus on facilitating debt reorganisation and second chances. Proper balancing of these two elements should be a policy priority. This will be especially beneficial for SMEs, who are more often in need of a second chance and prevent any distortion in the market. It is recommended that the banking authority looks into the matter in coordination with KOSGEB and the asset management industry. Better practices from other jurisdictions can be studied for this purpose.

3. A major issue for SMEs in Turkiye is their access to finance. **As a priority, SMEs' access to both bank credit and market-based financing needs to be enhanced.** Insofar as KOSGEB and KGF are concerned, recommendations about bank credit and market-based resources are presented separately.

   The total amount of bank credit to SMEs during the four-year period from ranging 2018 to 2021 was about €77 billion. During the same period, the amount of KGF-guaranteed bank credit was about €42 billion, which is more than half of total bank credit. Clearly, without KGF support, SMEs would have had a tougher problem in finding bank credit. When there is a KGF's guarantee, it is easier for a bank to extend credit to an SME. This can be criticized as a typical case of free risk transfer from banks and debtors to the general public. But, given the status quo, it would not be wise or realistic in the short run to suggest a reversal in the government's policy on credit guarantees for SMEs. However, **some improvements in the current KGF – SME credit model can be recommended**:

   a. In 2021 and previous years, 23% of total KGF-guaranteed credit was used by non-SME large companies. In line with the major mission of the KGF, this percentage can be reduced to leave more credit space for SMEs.
   b. In the current practice, a company applies for credit from a bank, the bank determines a credit limit for the company and then applies on behalf of the company to the KGF for a guarantee. The guarantee may be the only collateral for the credit, and it may also be a complement to the collateral already provided by the company. This is often a time-consuming process as most of the burden of credit assessment is on the bank. The bank may also have the incentive to demand excess collateral (if available) and then secure KGF's guarantee as an extra risk buffer. To handle these potential issues, it is therefore recommended that SMEs apply for a credit limit directly from the KGF and then apply for credit from banks within the limit set by the KGF. The first-step credit evaluation mechanism can be designed jointly with KGF and KOSGEB (this mechanism and the filter suggested in item 1 above can be based on the data-driven methodology to be explained later.)

c. Banks in Turkiye typically require collateral with an assessed value equal to a multiple of the credit line. This multiple can be higher for SMEs as they may be riskier as debtors. The result is a rigid structure where valuable collateral assets remain unusable until the credit is fully paid back. This is a particular source of difficulty for SMEs with already limited sources of collateral. To solve this problem, it is recommended that KGF constructs a "collateral pool" in the form of a diversified fund where collateral assets are recorded as fund shares. As bank credits are paid back and hence remaining credits risks are reduced, a commensurate proportion of these shares can be released for use as collateral in new credit and other financial contracts. The purpose is to make maximum use of existing collateral assets for better access to more bank credit and also possibly reduce the demand for outright KGF guarantees in the long run.

It has been mentioned before that SMEs in Turkiye have very limited access to market-based financing such as public issuance of equity and bonds. The markets for private equity and venture capital, which are often the first steps towards reaching public markets, are yet in their infancy stages. This is a major problem for two basic reasons. Firstly, insufficient equity in a balance sheet means higher financial risk for the company itself and also for suppliers of credit. Secondly, proper corporate governance and stakeholder engagement are difficult to ascertain in companies with no exposure to outside capital. Banks do not have much incentive to monitor company affairs because bank credit in Turkiye is in large part fully collateralized. **Therefore, it is a critical necessity to design a structure whereby SMEs can easily and properly access financial markets.** As it may be premature at this stage to suggest a 'light' securities exchange for SMEs, another convenient short-term solution may be considered.

As detailed in the first section of the report, there are a number of investment funds (PE funds, VC funds, technology zones) dedicated to raise private equity capital for SMEs. They are all within the ecosystem around KOSGEB. The size and diversity of these funds seem to have a long way to reach the whole set of SMEs. Most importantly, for equity investors in SMEs, routes to exit are limited. **To tackle these issues, it is recommended that a trading venue is set up, which serves as a secondary market for private equity and VC shares (private debt instruments may also be considered in due time).** This increased liquidity can certainly help attract global and domestic equity investors in SMEs. This trading venue will be subject to regulation similar to that of the Capital Markets Law in Turkiye but adapted in the format of a non-public exchange of private equity shares of SMEs. There are many examples of similar venues in the US, UK, Canada, and some EU countries. KOSGEB and the Capital Markets Board can work together on the governance structure of such an exchange.

The general recommendations above imply several critical new tasks for KOSGEB. These range from empirical research and analysis, data filtering for credit policies, analysis of policy impact and outcomes, and similar. **It is therefore recommended that KOSGEB organizes a research centre for data analysts with advanced skills on big data analytics and statistical modelling.** This can be in the form of a new department within KOSGEB's current structure, or as a standalone research centre under the auspices of the Ministry of Industry and Technology. The centre should be dedicated to all SME-related issues and provide real evidence for policy design and assessment.

Specific recommendations for short-term action

The empirical findings in the report also imply several recommendations for immediate action by KOSGEB. These can be carried out by the proposed research centre or, if the setup of the

centre will take time, by current experts at KOSGEB. The recommended work streams are explained below.

In cases where KOSGEB's support for a single SME, or a selected group of SMEs, prerequires evaluation of financial performance and potential risk of financial distress, the following guiding recommendations can be readily taken into consideration by KOSGEB and implemented:

- Patterns in the eight financial indicators during the 2017 – 2019 period contained clear signals of probable insolvency in 2020. Therefore, as a first step in decision making, it is important to investigate the behaviour of these financial indicators during the last two to three years prior to the year when any type of financial support is being considered. Companies that fail to pass this assessment must be re-evaluated more carefully in a second round.
- It is found that companies with higher export intensity are more fragile financially than those with higher import intensity. For economic growth, it is perfectly acceptable to offer policy support for exporters and even sometimes to discriminate in favour of exporters. However, empirical evidence here suggests that export support programmes can be more selective in identifying exporters with better financial prospects. Some or all eight financial indicators may be scrutinized before providing blanket support for export companies.
- Younger companies with ages less than four years seem to have a higher probability of insolvency. KOSGEB support programmes that prerequire good financial standing may leave out companies with ages less than five or six years.[35] A minimum level of corporate maturity appears to be necessary to deserve conventional credit. Companies older than 35 years also seem to carry higher risks of insolvency and their financial health must be evaluated more carefully before any support is given.
- Empirical evidence indicates that companies with higher probability of insolvency disclose and report less information. A decrease in the number of reported items over time signals a higher probability of potential distress leading to insolvency. Leaving the burden of explanation on companies themselves, KOSGEB may exclude from support programmes, all companies with deteriorating reporting quality and detail.

As the economic spill overs of the Covid-19 pandemic and the Ukrainian-Russian conflict are yet to be fully seen, it is strongly suggested that KOSGEB rerun the methodology of this study with 2021 data and proceed accordingly.

A limitation of this study is that all findings are the results of analysis of aggregated data across company size, industry, financial measure, company age and similar. In most calculations, data aggregation in turn is often based on an unorthodox definition of systemic importance. Hence, the findings may not provide complete insights into behaviour by individual companies. Neither do they cover all the interfirm relations in all dimensions in the SME sector. This is an issue that KOSGEB should look into in order to obtain more detailed data that in turn will allow KOSGEB to do a finer analysis and target companies in a more specific fashion. Nevertheless, they provide a strong base and clear direction as to how these can be done.

The concept of systemic importance was introduced in the financial industry after the Global Financial Crisis of 2008. The idea is realistic because measuring and managing stand-alone

[35] Of course, this suggestion does not apply to programs to support for new start-ups, especially in new technologies and other strategic areas. They may deserve support without much financial scrutiny at first. Start-ups may be guided to reach more suitable types of financing such as venture capital.

institutional risks are not sufficient and that contagion risks are often more detrimental. Therefore, financial policy and regulation should properly address contagion risks spread by systemically important financial institutions, which are either too big, too complex, or too interconnected to fail and trigger chains of failure in the whole system.

Risks are contagious not only between financial institutions but also between financial institutions and (non-financial) companies, and further between companies themselves. Some companies in the real sector are systemically important because they are either too big or they have a vital role on the supply chain. Obvious examples are providers of cloud computing services such as Amazon and Microsoft. Their exposure to cyber risks and failure thereof is certainly a source of systemic risk for the whole economy. Another famous example is the case of the three big auto companies in the US. More than half of their suppliers are the same suppliers, most of which are SMEs, and the failure of any one of the big three can be detrimental not only for the thousands of suppliers but also eventually for the other big two. Similar cases of domestic scale can be seen in many countries.

In today's interconnected world, it would be a mistake to ignore this fact and any policy as such cannot deliver all the desired results. In recent years, some studies (for example, (Welburn, et al., 2020), (Carvalho & Tahbaz-Salehi, 2019), (Acemoglu, Carvalho, Ozdaglar, & Tahbaz-Salehi, 2012)) have been looking into this issue of systemic risk in the real economy. Necessary methods of data analytics, graph/network analytics and other computational tools are now available (Erciyes, 2018), (Stoffi, Riccaboni, & Rungi, 2020). The major obstacle to such studies in many countries is the lack of centralized databases to trace the interconnections between companies.

This study proposes a new conception of systemic importance in the real economy and the SME sector. This is deemed useful for the following facts and reasons:

- The SME sector "as a whole" is systemically important. But, by definition, no single SME can be systemically important by itself.
- Compared to larger companies, SMEs are less resilient to external shocks (e.g., the Covid-19 problem). Furthermore, by nature of their size and governance capacity, SMEs are exposed to higher levels of known risks.
- It may be enlightening to know how external shocks and contagious risks propagate among SMEs and possibly spill over to larger companies. Similarly, it is also good to know how the failure of a large company impacts the SMEs with which it does business, either as suppliers or customers. Indeed, it is the extent of this impact that largely determines whether a large company is systematically important.
- Knowledge of the patterns of risk propagation among companies, based on an algorithm-based approach, will be useful in designing a policy-level early detecting system before companies fall into financial distress. It will also be useful in works to improve the insolvency regime because procedures of reorganisation can then be structured accordingly.

There are millions of SMEs with a wide range of continually changing characteristics. It is difficult to imagine a one-size-fits-all policy model for all companies and for all times. Therefore, from a purely economic and financial perspective, it is necessary to identify the subset of SMEs that because their operating nature (size, complexity, interconnectedness, dependence, etc.), when faced with the risk of possible financial deterioration, can spread this risk to other SMEs within the same subset or other interconnected subsets (either vertical or horizontal subsets) and therefore creating a systemic risk within the SME 'ecosystem'. The companies in this subset are called "systemically important SMEs" in this study.

Considering how the findings in this study were obtained, the findings themselves, and, most importantly, the availability of comprehensive and detailed databases in Turkiye, it is strongly recommended to develop a data-based methodology to identify systemically important SMEs. Any policy to be developed by KOSGEB, or any policy at a broader level, can use such a methodology as a strategic guideline. KOSGEB should use the identification tool for systemically important SMEs to develop the necessary policies to prioritise the support for those SMEs that pose a greater threat to the entire network of SMEs.

Like the practice in the finance industry, the identification of systemically important SMEs in the production and trade networks should utilize a graph/network analytics methodology. The databases at the Ministry of Industry and Technology are very suitable for this approach. A procedural guideline and some parametric descriptions are as follows:

Network description: The bilateral commercial transactions between companies in the *babs* database constitute a weighted directed graph. *Nodes* are suppliers and buyers. Nodes are connected on the network. *Directed edges* are the transactions between the nodes. *Weights* of the connections between the nodes are the monetary values of the transactions.

Network metrics: *Degree* of a node is the sum of the numbers of connections into and out of the node. *Distance* between two nodes is the number of steps between the nodes. The shortest possible distance ("geodesic distance") between two nodes is one step where a buyer directly transacts with a supplier. The maximum possible distance between two nodes is naturally the network's diameter, which shows how dispersed the companies are in a network.

Measures of importance: Several measures of centrality are used for this purpose:

Degree centrality: This measure identifies the nodes with the largest number of direct links to other nodes.
Eigenvalue centrality: This measure is the extent to which a node influences directly or indirectly other nodes. A node with a higher eigenvector centrality is connected to nodes that are themselves connected to many other nodes.
Closeness centrality: This measure identifies the nodes with the shortest total distance (smallest number of steps) to all other nodes in the network. It shows the potential of a node to propagate risks across the whole system.
Betweenness centrality: This measure is to find the nodes that lie on the largest number of shortest paths between other nodes. The nodes with high betweenness centrality serve as bridges between company clusters.

Methodology: The *babs* database of purchases and sales between companies is a very comprehensive and convenient database to calculate the network parameters. After a suitable filtering of the database for missing and erroneous data, all the centrality measures are calculated for companies of all sizes (possibly, a selective subset of micro-SMEs, small and medium-sized SMEs, and large companies). Micro-SMEs may be needed to estimate adequately the degree and eigenvalue centralities of other SMEs and large companies. Then, an optimization logic must be developed to compute the statistically most significant linear combination of the centrality measures.[36] This optimization will yield a "score of systemic importance" for each company. Large companies with scores

[36] It must be mentioned that the calculation of these measures requires intense iterative algorithms across many edges between nodes. Hence, high computation power and computer memory are needed.

above a certain level are classified as systemically important. Identification of the systemically important subset of SMEs will require further investigation of the observed distribution of SME scores. SMEs with scores above a "proper" quantile will constitute the set of systemically important of SMEs. The choice of a proper quantile is a matter of both experimentation and back testing, and policy decision.

Testing the methodology: The result of the network analysis will be a list of systemically important SMEs and another list of other SMEs. It may be useful to rerun the statistical analysis used in this study (or a more refined approach using linear predictive models) and explore how the two group of companies differ in terms of probability of insolvency. Of course, conclusive tests of the methodology may need a few trials in different time periods and letting the data speak for itself.

Systemic importance of a company, or group of companies, can manifest itself in different ways. For example, it would be informative to estimate the probability of insolvency of single firms triggered by bankruptcies in their direct and indirect network connections, and how fast and how far these bankruptcies can propagate on the network. One such study (Arata, 2018) argues that, as the interconnectedness of a network increases, the risk of insolvency propagation increases at first and then starts to decrease since a highly connected network dilutes the insolvency shocks to the overall economy. The study differentiates between firm level risk and propagation risk. The concentration of the forward and backward linkages of a firm through its customers and suppliers is a measure of firm level insolvency risk. The degree of connectedness of the subnetwork of insolvent firms to the overall network is a sign of insolvency propagation and systemic risk. The diameter of a network component is the maximum length of shortest paths among pairs of connected bankrupt firms. The length of this diameter is a measure of how far away insolvency risk propagates. Another study (Hazama & Uesugi, 2017) investigates the extent of default propagation through the trade payables chain. The channel of risk transmission is the default of customers on trade payables. "First-stage" defaulters are likely to default based on their own balance sheet, and "second stage" or "later stage" defaulters are suppliers of these first-stage defaulters and are likely to default also on their own trade payables.

The first major task of the proposed research centre can be the development of a data-based methodology as explained above. However, it must be understood that, as necessary as it may be to identify systemically important SMEs, it alone cannot be a complete basis for policy design. This is because not all other SMEs are unimportant. It is also because systemic importance in the supply chain does not necessarily imply financial viability. A company can be unviable simply because of bad financial management. Similarly, a company may very well be a "zombie but systemically important SME." Therefore, regardless of systemic importance, a proper policy target should consider the possible transmission of insolvency risks from unviable companies to viable companies. Knowledge of transmission channels can be useful in designing a policy-level early detecting mechanism, by use of algorithms, to augment the proposed network methodology. This too must be based on empirical evidence and hence the importance of an insolvency database.

Finally, it must be recognized that, without adequate access to finance, a super data-based methodology coupled with a better insolvency regime will not eliminate SMEs' dependence on government support and "subsidized" bank credit as the only source of financing in times of trouble. This may be a source of moral hazard. This may be a source of moral hazard. Therefore, SMEs' access to finance should be easier, broader and more diversified. This calls for betterment in two areas. The first is about structural improvements not only in access to

bank credit but also in the business models of related intermediaries such as factoring companies and asset management companies. Secondly, SMEs' access to national and global financial markets must be considered as a critical component of a real long-term reform. In Turkiye, financial markets are not as developed, and instruments are not as sophisticated as the size of the economy warrants. This is a bigger issue that falls outside of the scope of this study. But SMEs should not be ignored in reforms of the financial markets in Turkiye. Since capability to access market-based financing prerequires improvements in corporate governance and financial management at the company level, the disciplining power of the markets should not be underestimated.

Appendix 1 – Industries

Industry definition	NACE2	NACE1
Crop and animal production, hunting and related service activities	1	A
Forestry and logging	2	A
Fishing and aquaculture	3	A
Mining of coal and lignite	5	B
Extraction of crude petroleum and natural gas	6	B
Mining of metal ores	7	B
Other mining and quarrying	8	B
Mining support service activities	9	B
Manufacture of food products	10	C
Manufacture of beverages	11	C
Manufacture of tobacco products	12	C
Manufacture of textiles	13	C
Manufacture of wearing apparel	14	C
Manufacture of leather and related products	15	C
Manufacture of wood and of products of wood and cork, except	16	C
Manufacture of paper and paper products	17	C
Printing and reproduction of recorded media	18	C
Manufacture of coke and refined petroleum products	19	C
Manufacture of chemicals and chemical products	20	C
Manufacture of basic pharmaceutical products and pharmaceutical	21	C
Manufacture of rubber and plastic products	22	C
Manufacture of other non-metallic mineral products	23	C
Manufacture of basic metals	24	C
Manufacture of fabricated metal products, except machinery and	25	C
Manufacture of computer, electronic and optical products	26	C
Manufacture of electrical equipment	27	C
Manufacture of machinery and equipment	28	C
Manufacture of motor vehicles, trailers, and semi-trailers	29	C
Manufacture of other transport equipment	30	C
Manufacture of furniture	31	C
Other manufacturing	32	C
Repair and installation of machinery and equipment	33	C
Electricity, gas, steam, and air conditioning supply	35	D
Water collection, treatment, and supply	36	E
Sewerage	37	E
Waste collection, treatment, and disposal activities; materials	38	E
Remediation activities and other waste management services	39	E
Construction of buildings	41	F
Civil engineering	42	F
Specialized construction activities	43	F
Wholesale and retail trade and repair of motor vehicles and	45	G
Wholesale trade, except of motor vehicles and motorcycles	46	G
Retail trade, except of motor vehicles and motorcycles	47	G
Land transport and transport via pipelines	49	H
Water transport	50	H
Air transport	51	H
Warehousing and support activities for transportation	52	H
Postal and courier activities	53	H
Accommodation	55	I
Food and beverage service activities	56	I
Publishing activities	58	J
Motion picture, video and television programme production, sound	59	J
Programmeming and broadcasting activities	60	J
Telecommunications	61	J
Computer programmeming, consultancy, and related activities	62	J

Information service activities	63	J
Financial service activities, except insurance and pension funding	64	K
Insurance, reinsurance, and pension funding, except compulsory social	65	K
Activities auxiliary to financial services and insurance activities	66	K
Real estate activities	68	L
Legal and accounting activities	69	M
Activities of head offices; management consultancy activities	70	M
Architectural and engineering activities; technical testing and	71	M
Scientific research and development	72	M
Advertising and market research	73	M
Other professional, scientific, and technical activities	74	M
Veterinary activities	75	M
Rental and leasing activities	77	N
Employment activities	78	N
Travel agency, tour operator and other reservation service and	79	N
Security and investigation activities	80	N
Services to buildings and landscape activities	81	N
Office administrative, office support and other business support	82	N
Public administration and defence; compulsory social security	84	O
Education	85	P
Human health activities	86	Q
Residential care activities	87	Q
Social work activities without accommodation	88	Q
Creative, arts and entertainment activities	90	R
Libraries, archives, museums, and other cultural activities	91	R
Gambling and betting activities	92	R
Sports activities and amusement and recreation activities	93	R
Activities of membership organizations	94	S
Repair of computers and personal and household goods	95	S
Other personal service activities	96	S
Activities of households as employers of domestic personnel	97	T
Undifferentiated goods- and services-producing activities of private	98	T
Activities of extraterritorial organizations and bodies	99	U

Appendix 2 – Samples from data

As a first example, for industry code "14" (Manufacture of leather and related products) and year 2019, below is the table of median values of financial ratios for active and inactive firms, and the difference between the two (inactive minus active). Due to the sparse nature of data, all combinations do not have sample companies and hence the empty cells.

Ratio	Micro			Small and medium-sized			Large		
	Active	Inactive	Dif	Active	Inactive	Dif	Active	Inactive	Dif
Asset turnover	13.81	17.76	3.95	1.93	1.95	0.02	1.47	1.74	0.28
Current ratio	1.24	1.88	0.64	1.25	1.18	(0.07)	1.40	1.19	-0.21
Debt / Assets	0.81	0.43	(0.38)	0.77	0.83	0.05	0.71	0.61	-0.10
Financial Debt / Assets	(0.07)	(0.05)	0.02	-	-	-	0.15	0.03	-0.12
Net margin	-	0.01	-	0.01	0.01	-	0.02	0.02	0.00
RoA	0.18	0.25	0.07	0.06	0.04	(0.02)	0.08	0.05	-0.03
RoE	0.40	0.29	(0.11)	0.15	0.20	0.05	0.15	0.12	-0.03
ST Debt / Assets	0.44	0.43	(0.01)	0.67	0.75	0.08	0.53	0.50	-0.02

A second example to see how a certain ratio might fluctuate across industries, the values for current ratios for the year 2019 are provided below. It is apparent that median current ratio figures for large companies are mostly above those for SMEs in most industries.

	Micro			Small and medium-sized			Large		
NACE2	Active	Inactive	Difference	Active	Inactive	Difference	Active	Inactive	Difference
1				1.06	1.1	0.04			
8				1.1	1.07	-0.03			
10				1.39	1.45	0.06	1.51	1.53	0.02
13				1.36	1.12	-0.24	1.52	1.63	0.11
14	1.24	1.88	0.64	1.25	1.18	-0.07	1.4	1.19	-0.21
15				1.27	1.49	0.22			
16				1.33	1.08	-0.25			
17				1.41	1.12	-0.29	1.63	1.13	-0.49
18	1.43	1.74	0.31	1.23	1.04	-0.19	1.4	1.35	-0.05
20				1.49	1.2	-0.29	1.92	1.29	-0.63
22				1.34	1.24	-0.1	1.62	1.81	0.19
23				1.25	1.13	-0.13	1.49	1.52	0.04
24				1.21	0.98	-0.23	1.6	1.03	-0.57
25				1.28	1.38	0.1	1.62	1.29	-0.34
26							1.9	2.67	0.78
27				1.24	1.44	0.2	1.65	1.45	-0.2
28				1.4	1.29	-0.11	1.64	1.46	-0.18
29							1.63	1.63	0
30							1.3	4.25	2.95
31	2	40.42	38.43	1.21	1.17	-0.04	1.4	1.9	0.5
32				1.41	1.08	-0.33			
33				1.21	1.17	-0.04	1.69	1.26	-0.43
35	0.45	0.98	0.53	0.67	0.57	-0.1	1.02	0.74	-0.29
38				1.27	1.06	-0.21			
41	1.06	1.14	0.08	1.24	1.15	-0.1	1.35	1.52	0.17

42	1	0.74	-0.26	1.19	1.07	-0.12	1.34	1.07	-0.27
43	1.07	1.1	0.03	1.14	1.08	-0.06	1.2	1.42	0.23
45	2.12	2.06	-0.06	1.4	1.23	-0.17	1.28	1.09	-0.2
46	1.51	1.57	0.06	1.27	1.13	-0.14	1.33	1.14	-0.19
47	1.54	2.12	0.58	1.29	1.18	-0.12	1.26	1.01	-0.25
49	2.51	1.03	-1.47	1.08	1.19	0.11	1.13	1.22	0.09
50				1.32	1.03	-0.29	1.36	0.31	-1.05
52	1.98	29.33	27.35	1.28	1.54	0.26	1.36	1.03	-0.33
53				0.95	0.98	0.03			
55	0.84	7.4	6.56	1.01	0.83	-0.18	1.08	1.5	0.42
56	1.09	1.08	-0.01	1.11	1.09	-0.01			
58				1.51	2.3	0.8	1.72	4.58	2.86
59				1.03	1.06	0.03			
61							1.29	1.62	0.33
62	0.9	0.96	0.07	1.41	1.27	-0.14	1.63	1.75	0.12
66							1.85	1.41	-0.44
68	1.11	3.07	1.96	1.07	1.23	0.16	1.26	0.44	-0.82
69	2.19	1.7	-0.49	2.35	1.42	-0.93			
70				1.25	1.04	-0.21	1.15	1.13	-0.02
71	1.11	4.29	3.18	1.25	1.33	0.08	1.22	1.73	0.51
73	1.68	1.01	-0.67	1.09	1.16	0.07	1.07	1.13	0.06
74	1.32	1.24	-0.08	1.16	1.24	0.09			
75	1.61	1.51	-0.1						
77	1.59	5.12	3.53	1.11	1.02	-0.09	0.86	1.27	0.41
78				1.15	1.29	0.14	1.23	1.21	-0.01
79	1.38	1.05	-0.33	1.13	1.11	-0.02	1.09	1.46	0.37
80				1.36	1.33	-0.03	1.44	1.3	-0.14
81	1.39	3.14	1.75	1.32	1.2	-0.12	1.39	2.21	0.83
82				1.16	1.16	0.01	1.6	1.56	-0.04
85				0.97	0.5	-0.46	0.81	0.93	0.11
86				1.39	1.18	-0.21	1.15	0.94	-0.21
88				1.15	1.11	-0.04			
90				1.07	1.16	0.09			
95	1.62	1.33	-0.29	1.15	1.17	0.02			
96	1.5	1.38	-0.12	1.24	1.1	-0.14			

Appendix 3 – The US and Irish regimes for SMEs

The US case

In February 2020, the US added Sub-Chapter 5 to Chapter 11 in order to allow small businesses with aggregated debt that does not exceed $2.75 million reorganise their claims under a streamlined procedure. With the Covid-19 emergency legislation, this limit was increased to $7.5 million for an initial period of one year until March 2021. The higher emergency limit was subsequently extended for one year by the enactment of the COVID-19 Bankruptcy Relief Extension Act of 2021 (Congress of the United States, 2021). In June 2022, the Correction Act, extended this higher threshold for two more years, until June 2024.

The eligibility of the debtor to access Sub-Chapter 5 is based on its financial exposures and not on its number of employees or annual revenues. Sub-Chapter 5 offers a less costly and more efficient and streamlined way to restructure debts. However, unlike most chapter 11 cases, it involves the appointment of a trustee by the US Trustee Programme, which is part of the Department of Justice and has a mission to promote the integrity and efficiency of the bankruptcy system for the benefit of all stakeholders: debtors, creditors, and the public. The main role of the trustee is to facilitate a consensual restructuring plan.

Sub-Chapter 5 requires that a plan of reorganisation is filed within 90 days of the opening of the bankruptcy case. As for Chapter 11 cases, the debtor remains in possession. Specific Sub-Chapter 5 benefits are that:

(i) Shorter deadlines
(ii) No creditors' committee typically and no approval by creditors of the reorganisation plan is required as, if there is no consensus by creditors, the court can confirm the plan if it finds it to be fair.
(iii) No detailed disclosure statement is required (as for other Chapter 11 cases)
(iv) Creditors cannot submit a counter reorganisation plan and
(v) There are no mandatory quarterly fees and administrative expenses can be paid by the debtor in instalments.

Of the more than 412,000 bankruptcy cases filed in the US during 2021, about 5,000 were chapter 11 (reorganisation) business cases (including Sub-Chapter 5) and approximately 9,200 were chapter 7 (liquidation) business cases. Thus, business bankruptcy filings accounted for about 3.5% of all bankruptcy cases filed.

Insolvency data so far indicates that the Sub-Chapter V procedures has been popular with small businesses and successful in supporting business reorganisation. Approximately three quarters of Chapter 11 small businesses have elected to proceed under Sub-chapter V to date, with more than 4,200 cases recorded through to the end of August 2022. Confirmation times have been consistently faster for Sub-chapter V cases than for Chapter 11 cases involving small businesses, which have not elected for Sub-chapter V. The average confirmation time is four months faster for Sub-chapter V cases to date. Based on results from 2020 and 2021 filings, Sub-chapter V cases are confirming plans at approximately double the percentage, while being dismissed at approximately half the percentage, of Chapter 11 small business cases. Approximately 70% of confirmed Sub-chapter V plans have been consensual plans, which may be due to the appointment of a trustee to facilitate plans.

The case of Ireland

In the echo of the Covid-19 pandemic, the Irish government introduced a new procedure called the Small Company Administrative Rescue Process (SCARP) (Government of Ireland, 2021) to give help smaller viable, yet insolvent companies. Ireland has another successful reorganisation procedure known as 'examinership', however the associated costs of this procedure mean that it is not

appropriate for micro and smaller enterprises. The new procedure can only be initiated by the company, and it permits the directors to appoint a qualified insolvency practitioner known as a 'Process Adviser' to prepare a rescue plan for the company. Unlike examinership, this procedure is fully out of court. Nevertheless, there is the ability to stay any proceedings against the debtor and restrain further proceedings, including winding-up.

Companies eligible for the SCARP scheme must meet each of the following requirements:

(i) Companies should meet the small or micro company definition in the Companies Act 2014 which requires a company to meet two of the following three requirements:
    - No more than 50 employees for a small company or 10 for a micro company
    - Turnover must not exceed €12 million for a small company or €700,000 for a micro company; and
    - Balance sheet must not exceed €6 million for a small company or €350,000 for a micro company.

(ii) The company is, or is likely to be, unable to pay its debts.

(iii) The company must not be in liquidation.

(iv) The company must not have appointed an examiner or process adviser in the previous five years.

(v) If a receiver has been appointed to the company, the company is eligible only if that receiver has been appointed for a period of less than three working days.

The SCARP scheme consists of three stages:

1. an assessment of eligibility: whether the company is insolvent or there is a likelihood of insolvency and the preparation of a Statement of Affairs and a Statutory Declaration comprising the financial information of the debtor.
2. the appointment of a Process Adviser: an insolvency practitioner appointed by the company to oversee and run the process and determine whether the company has a "reasonable prospect of survival".
3. the development and approval of a Rescue Plan: the Process Adviser, after liaising with all creditors shall prepare a detailed Rescue Plan within 49 days of appointment. The plan is considered passed where 60 % in number representing a majority in value of the claims represented at that meeting have voted, either in person or by proxy, in favour of the Rescue Plan. "Cross-class cram down" is the approval mechanism for the Rescue Plan. Following the 21-day period, where no objections have been lodged, the Rescue Plan is considered binding.

With the approval and participation of creditors the rescue process is capable of conclusion within 70 days. However, if the process is rejected or opposed by a creditor, it can be referred to the relevant court, thereby increasing the overall timeframe. No data has yet been published on the use of the SCARP scheme.

References

Acemoglu, D., Carvalho, V., Ozdaglar, A., & Tahbaz-Salehi, A. (2012). The Network Origins of Aggregate Fluctuations. *Econometrica, 80*(5).

Arata, Y. (2018). *Bankruptcy Propagation on a Customer-Supplier Network: An Empirical Analysis in Japan* . Japan: Research Institute of Economy, Trade and Industry.

Banks Association of Turkiye. (2022). Retrieved July 2022, from https://www.tbb.org.tr

Banks Association of Turkiye. (2022). *Financial Restructuring Framework Agreements.* Retrieved July 2022, from https://www.tbb.org.tr/tr/bankacilik/arastirma-ve-yayinlar/ozel-dosyalar/4489

BRSA. (2022). *Banking Regulation and Supervision Agency of Turkiye*. Retrieved September 2022, from www.bddk.org.tr

Capital Markets Board of Turkiye. (2022). *Information on Security Issues and Public Offerings.* Retrieved July 2022, from https://www.spk.gov.tr/Sayfa/AltSayfa/895

Carvajal, A., Davis, R., Divakaran, S., & Konidaris, T. (2020). *Capital Markets and SMEs in Emerging Markets and Developing Economies: Can They Go the Distance.* Washington, D.C.: The World Bank Group.

Carvalho, V., & Tahbaz-Salehi, A. (2019). Production Networks: A Primer. *Annual Review of Economics, 11*(1).

Congress of the United States. (2021). *COVID-19 Bankruptcy Relief Extension Act of 2021.* Retrieved from https://www.congress.gov/bill/117th-congress/house-bill/1651

EBRD. (2018). Retrieved 2022, from https://www.ebrd.com/what-we-do/legal-reform/access-to-finance/factoring.html

EBRD. (2020). *Core Insolvency Principles.* Retrieved 2022, from www.ebrd.com

EBRD. (2022). *Business Reorganization Assessment – Turkey.* Retrieved 2022, from https://ebrd-restructuring.com/economy-profile/turkey

EBRD and Clifford Chance. (2018). *Regulating Investment- and Lending-based Crowdfunding: Best Practices.* Retrieved from https://www.ebrd.com/news/publications/guides/best-practices-for-regulating-investment-and-lendingbased-crowndfunding.html

EBRD Legal Transition Team. (2022). *EBRD Insolvency Assessment on Reorganisation Procedures.* Retrieved 2022, from https://ebrd-restructuring.com/main-report

Erciyes, K. (2018). *Guide to Graph Algorithms: Sequential, Parallel and Distributed.* Springer International Publishing.

European Commission. (2021). *Annual Report on European SMEs 2020/2021 - Digitalisation of SMEs.* Retrieved 2022, from https://ec.europa.eu/docsroom/documents/46062/

European Parliament. (2017). *Impact on SMEs of the Proposal of Preventive Restructuring, Second Chance and Improvement Measures.* Retrieved from http://www.europarl.europa.eu/studies

European Union. (2019/1023). *European Parliament and of the Council of 20.06.2019 on preventive restructuring frameworks, on discharge of debt and disqualifications, and on measures to increase the efficiency of procedures concerning restructuring, insolvency and discharge of debt.* Retrieved 2022, from https://eur-lex.europa.eu/legal-content

Facebook / OECD / World Bank. (2020). *The Future of Business Survey.* Retrieved from https://www.dataforgood.fb.com/global-state-of-smb

Gourinchas, P., Kalemli Özcan, Ş., Penciakova, V., & Sander, N. (2021). *Covid-19 and SMEs: A 2021 Time Bomb?* NBER. Retrieved from http://www.nber.org/papers/w28418

Government of Ireland. (2021). *The Small Company Administrative Rescue Process.* Retrieved from https://enterprise.gov.ie/en/publications/publication-files/small-company-administrative-rescue-process.pdf

Hazama, M., & Uesugi, I. (2017). Measuring the systemic risk in interfirm transaction networks. *Journal of Economic Behaviour & Organization*, 259-281.

IMF. (2021). *Insolvency Prospects Among Small-and-Medium-Sized Enterprises in Advanced Economies: Assessment and Policy Options.* Staff Discussion Paper 2021/002. Retrieved from https://www.imf.org/en/Publications/Staff-Discussion-Notes

KGF. (2022). *Kredi Garanti Fonu*. Retrieved from www.kgf.com.tr

KOSGEB. (2019). Retrieved 2022, from https://webdosya.kosgeb.gov.tr/Content/Upload/Dosya/Mevzuat/2020/KOSGEB_Stratejik_Plan%C4%B1_(2019-2023).pdf

KOSGEB. (2022). Retrieved 2022, from https://en.kosgeb.gov.tr/site/tr/genel/detay/347/about-kosgeb

Kristin van Zwieten, H., Eidenmuller, H., & Sussman, O. (2020). Bail-outs and bail-ins are better than bankruptcy: A comparative assessment of public policy responses to Covid-19 distress. *Law Working Paper 535/2020*. Retrieved 2021, from https://ecgi.global/content/working-papers

OECD. (2020). Coronavirus (COVID-19): SME Policy Responses.

OECD. (2021). *OECD SME and Entrepreneurship Outlook 2021 - Country Profiles.* Paris: OECD Publishing. doi:https://doi.org/10.1787/97a5bbfe-en

OECD. (2021). *The Future of Corporate Governance in Capital Markets Following the COVID-19 Crisis.* Paris: OECD Publishing. doi:https://doi.org/10.1787/efb2013c-en

OECD. (2022). *Recommendation of the Council on SME and Entrepreneurship Policy.* OECD/LEGAL/0473.

OECD. (2022). *SME Policy Index: Western Balkans and Turkey 2022: Assessing the Implementation of the Small Business Act for Europe.* Paris: OECD Publishing. doi:https://doi.org/10.1787/b47d15f0-en

Stoffi, F., Riccaboni, M., & Rungi, A. (2020). Machine Learning for Zombie Hunting: Firms' Failures and Financial Constraints. *SSRN*. doi:http://dx.doi.org/10.2139/ssrn.3588410

TSPB. (2022). *Turkish Capital Markets Association*. Retrieved from https://www.tspb.org.tr/tr/veriler/

TURKSTAT. (2022). Retrieved 2022, from https://data.tuik.gov.tr

United Nations. (2004 - 2021). *UNCITRAL Legislative Guide on Insolvency Law.* Retrieved 2022, from https://uncitral.un.org/en/texts/insolvency/legislativeguides/insolvency_law

United Nations. (2021). *UNCITRAL Legislative Guide on Insolvency Law for Micro- and Small Enterprises.* Retrieved 2022, from https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/msme_lg_insolvency_law_ebook.pdf

Welburn, J., Strong, A., Eloundou, F., Grana, J., Marcinek, K., Osoba, O., . . . Setodji, C. (2020). [27] Welburn, J., Strong, A., F. N. ElSystemic Risk in the Broad Economy: Interfirm Networks and Shocks in the U.S. Economy. *RAND Corporation*. doi:https://doi.org/10.7249/RR4185

World Bank. (2020). *Doing Business 2020 - Starting a Business.* Retrieved 2022, from https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020

World Bank. (2021). *Principles for Effective Insolvency and Creditor/Debtor Regimes.* Retrieved 2022, from https://pubdocs.worldbank.org/en/919511468425523509/ICR-Principles-Insolvency-Creditor-Debtor-Regimes-2016.pdf

World Bank. (2022). *World Development Report: Finance for an Equitable Recovery.* Retrieved 2022, from https://openknowledge.worldbank.org/bitstream/handle/10986/36883/9781464817304.pdf

World Federation of Exchanges. (2021). *Exchange issuer-related initiatives - Can responses to the pandemic encourage greater SME listing?* Retrieved July 2022, from https://www.world-exchanges.org/our-work/articles/exchange-issuer-related-initiatives-can-responses-pandemic-encourag

World Federation of Exchanges. (2022, July). Retrieved from https://www.world-exchanges.org

One Exchange Square

London

EC2A 2JN

United Kingdom

Website: ebrd.com