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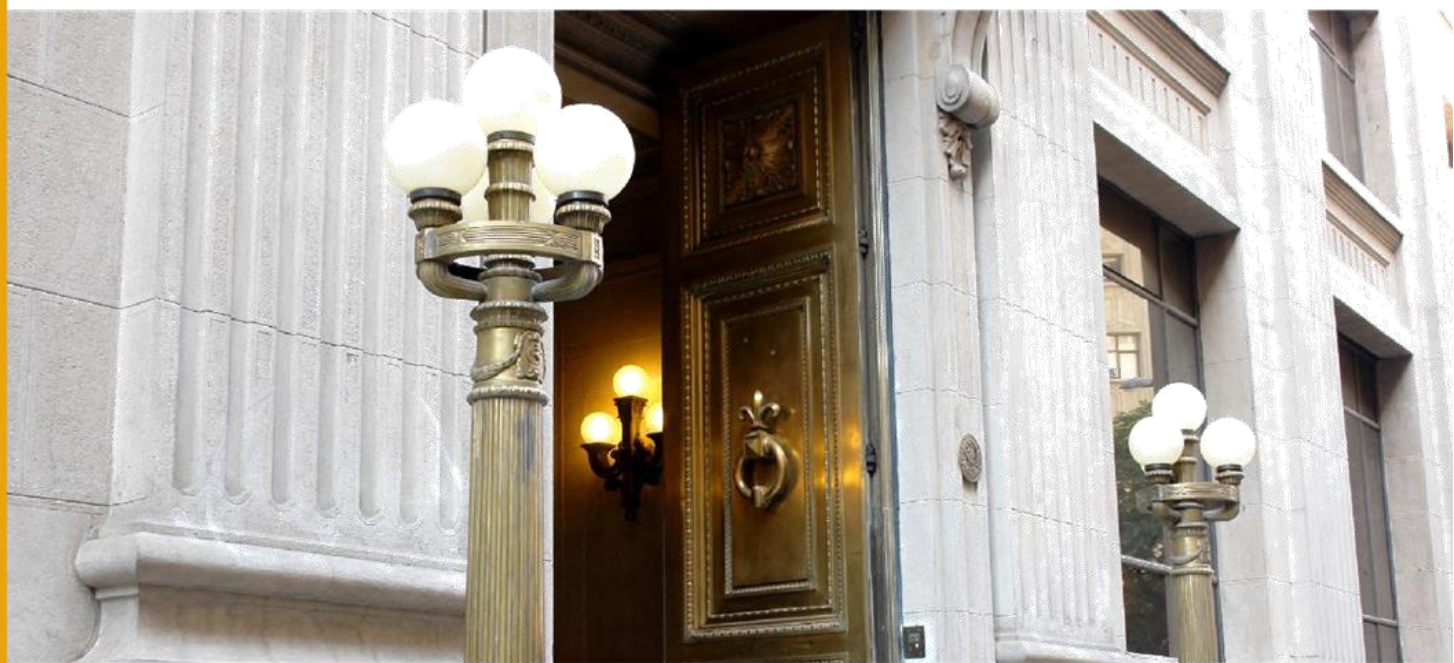
The impact of financial crises on industrial growth in the Middle East and North Africa

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N° 1045 Junio 2025

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Resumen

Utilizando datos de panel de países e industrias entre 1980 y 2019, este trabajo estima los efectos causales de las crisis financieras. El mecanismo del efecto de las crisis financieras en el crecimiento industrial considera un impacto total dado por la suma de un efecto directo sobre todas las industrias y un canal de dependencia de financiamiento externo. Las crisis de divisas tienen el peor impacto de todos los tipos de crisis en el país promedio. Las crisis financieras de todo tipo son considerablemente peores para las economías de Medio Oriente y Norte de África (MENA). Para los países MENA hay una reducción del crecimiento manufacturero del 2.8%, 6% y 1.2% durante las crisis bancarias, de divisas y de deuda soberana. Existe una heterogeneidad sustancial en los MENA, con Marruecos, Irak e Israel experimentando un impacto mucho más fuerte de todos los tipos de crisis financieras.

Abstract

Using country-industry panel data between 1980 until 2019, I estimate the causal effects of financial crises, with total impact given by the sum of a direct effect on all industries and an external finance dependence channel. Currency crises have the worst impact of all types of crises across all countries. Financial crises of all types are substantially worse for the Middle East and North Africa (MENA) economies. For MENA, there is a manufacturing growth reduction of 2.8%, 6% and 1.2% during banking, currency and sovereign debt crises. There is substantial heterogeneity across the MENA, with Morocco, Iraq and Israel experiencing a much stronger impact from all types of financial crises.

1 Introduction

Financial crises are especially significant events, because of their strong effects on economic activity (Laeven and Valencia 2020). Banking crises are especially concerning, because these often precede other financial crises such as sovereign debt default, currency crises and sudden stops (Kaminsky and Reinhart 1999, Bordo and Meissner 2016). The frequency of financial crises, particularly in emerging markets and developing economies, has increased since the end of the Bretton Woods era (Bordo and Meissner 2016, Rodrik 2021). Therefore, further research is needed on banking crises' channels and the policies required to shield the economies from its effects (Galati and Moessner 2018, Madeira 2024a). The Middle East and North Africa (MENA) region is an especially interesting region for studying the effects of financial crises on output, because several banks in the region have a different business model based on Islamic banking which prefers social impact (Hassani et al. 2010, Hassan et al. 2019) rather than financial profit and efficiency (Hakimi et al. 2023, Lassoued et al. 2023, Hussainey and Dalwai 2024). Furthermore, financial authorities in the MENA region also differ in their regulations relative to other countries (Ben Naceur and Omran 2011, Ben Naceur et al. 2014, Hakimi et al. 2023), with a strong focus on macroprudential policy (Prasad et al. 2016). Other characteristics of the MENA and Central Asia regions include a low domestic credit to GDP ratio (Hussainey and Dalwai 2024), lower coverage of credit bureaus (Saadani et al. 2011) and less credit access for small companies (Farazi and Rocha 2010, Blancher et al. 2019). The region is also known for its social unrest (Barrett et al. 2024), political connections to the financial system (Lassoued et al. 2023, Hussainey and Dalwai 2024), large role of state banks (Rocha 2010), geopolitical conflicts (Hussainey and Dalwai 2024, IMF 2024), and heterogeneous sensitivity to energy shocks due to countries being either large oil exporters or importers (IMF 2024).

This work studies the causal impact of financial crises on the real growth of a panel of 23 manufacturing industries across 102 countries for the period between 1980 and 2019.[1] One advantage

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[1]Note that assuming small industries are affected by national shocks, rather than the reverse, is a standard assumption in the macroeconomics literature. For instance, Rajan and Zingales 1998, Braun and Larrain 2005, Kroszner et al. 2007, Dell'Ariccia et al. 2008 and Cowan and Raddatz 2013 assume that national financial development, recessions, banking crises and sudden stops are exogenous relative to the individual manufacturing industries. This assumption is also credible relative to other usual identification assumptions used in the macroeconomics literature. For instance, it is standard to assume that small open economies are affected by

of using industry detailed data is that each industry is small relative to the national economy, addressing the issues of reverse-causality (Madeira 2024a). Furthermore, the country-industry level analysis allows to reveal which characteristics explain the sensitivity of industrial growth to the financial crises. I find that the degree of external finance dependence (the need to fund capital expenses with external funds that do not come from past earnings) is one channel through which financial crises affect growth. However, I find that the direct growth reduction on all industries, independently of their external finance dependence, is the main channel through which financial crises impact manufacturing. The empirical analysis has a particular focus on how the MENA region differs from other countries. I find that the MENA are more affected by financial crises than the other countries, even if the analysis is restricted to other emerging markets and developing economies (EMDEs). These results confirm the need for banks and financial institutions in the MENA region to keep improving their risk management practices (Harb et al. 2022).

The analysis uses mainly an industry-country dataset from the United Nations Industrial Development Organization (UNIDO), which compiles national accounts information for more than 100 countries using the same set of 23 manufacturing industries. The data includes 12 MENA countries: Algeria, Armenia, Egypt, Iraq, Israel, Jordan, Kuwait, Lebanon, Morocco, Oman, Tunisia, Turkey. I then combine this data with a list of the banking, currency and sovereign debt crises until 2019, compiled by Laeven and Valencia 2020 and Nguyen et al. 2022. I also use information on industries' external finance dependence (Rajan and Zingales 1998) to characterize the heterogeneous response across industries to shocks. The reason is that companies that cannot fund their capital expenses using past earnings must resort to banks or capital markets, being therefore more sensitive to financial frictions (Braun and Larrain 2005, Cowan and Raddatz 2013).

Using a panel data model with country-industry and time fixed effects, I obtain estimates of banking crises' effects on the industries' growth. The regressions control for other macroeconomic factors, such as current and previous inflation, real GDP growth, monetary policy and the countries' development level as measured by GDP per capita. Other consistent model estimates are obtained

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international shocks such as oil prices, which are taken to be exogenous due to the small size of each country. There are around 196 countries in the world, with 189 nations being members of the World Bank and IMF. Therefore, the average nation represents just 0.51% of the world's GDP. The median manufacturing industry in this dataset represents just 0.32% of the national GDP (as shown in Table 1). Therefore, these are industries that are too small to influence by themselves large national developments such as a financial crisis.

using quantile regression methods for panel data (Machado and Santos Silva 2019). Furthermore, I also show that the estimates of the external finance dependence channel are robust to including country-industry, country-year and industry-year fixed effects.

Using just the external finance dependence channel, I find that banking, currency and sovereign debt crises reduce manufacturing growth by 0.8%, 0.9% and 0.3% for the average country, 2.1%, 0.8% and 0.4% for EMDEs and 1%, 1% and 0.4% for the MENA region. For EMDEs the external finance dependence channel is quite powerful during banking crises. Furthermore, accounting for both country-industry and country-year fixed effects, the results show that the Great Financial Crisis (GFC) was substantially worse for externally dependent industries across the MENA countries.

In terms of the total impact of financial crises, the results show that currency crises are the worst type of financial crisis across all countries, including the MENA region. Currency crises have more than twice the total impact of banking crises and more than five times the impact of sovereign debt crises. This result could be due to many countries having implemented badly adjusted exchange rate pegs in the past (Frankel 2010). For the average country, there is a manufacturing growth reduction of 2.7%, 5.9% and 1.1% during banking, currency and sovereign debt crises. For EMDEs, there is a manufacturing growth reduction of 2%, 6% and 0.3% during banking, currency and sovereign debt crises. However, financial crises are substantially worse for the MENA economies. For MENA, there is a manufacturing growth reduction of 2.8%, 6% and 1.2% during banking, currency and sovereign debt crises. There is also substantial heterogeneity across the MENA region, with Morocco, Iraq and Israel experiencing a much stronger impact from all types of financial crises, either from the external finance dependence channel or in terms of its total impact.

This study complements the literature on the growth effects of financial crises (Rancière et al. 2008, Laeven and Valencia 2020). It is particularly related to the work of Dell'Ariccia et al. 2008, which shows that sectors more dependent on external finance suffer the most during banking crises. In a closely related paper, Kroszner et al. 2007 study whether banking crises impact sectors dependent on external finance more severely in countries with a less developed financial system. My work extends this literature in three ways: i) it uses three times as much data by enlarging the analysis from 41 to 102 countries; it extends the period of analysis until 2019, when previous studies ended in 2000 and ignored the GFC period (Dell'Ariccia et al. 2008, Kroszner et al. 2007); and iii) it measures the total impact of financial crises on manufacturing growth by estimating both

the direct effect on all industries and the external finance dependence channel, showing that the direct effect ignored by previous studies is the most relevant component. Finally, this is the first work to compare the effects of financial crises on the manufacturing industries growth in the MENA countries, which is a particularly relevant region due to its commodity and geopolitical risks.

This paper is organized as follows. Section 2 reviews the literature. Section 3 describes the data sources and the empirical model. Section 4 shows the effect of banking crises on industrial growth. Section 5 shows the effects of other types of financial shocks, such as currency and sovereign debt crises. Section 6 summarizes the external finance dependence channel and the total impact of financial crises on growth. Finally, Section 7 summarizes the main findings.

2 Literature review

2.1 Causes of financial crises

The theoretical and empirical literature on financial crises is extensive, therefore this section can only provide a brief summary. Interested readers can refer to the books of Gorton and Ordoñez 2023 and Brunnermeier and Reis 2025 for an extensive treatment of the theoretical models that explain the causes of financial crises. For an extensive review of the empirical literature on financial crises, readers can refer to the handbook chapter of Bordo and Meissner 2016. Furthermore, Galati and Moessner 2018 provide an extensive review of the macroeconomic models that incorporate financial frictions, crises and macroprudential policies that are intended to prevent future crises. Reinhart and Rogoff 2009 and Laeven and Valencia 2020 provide an extensive review of the history of financial crises across several countries since the beginning of the 20th century until now. Financial liberalization can cause crises, but it is also relevant to note that liberalization can have a positive effect on growth through increased firm entry, higher capital accumulation and an expansion of employment (Levchenko et al. 2009, Levine 2005). This can be relevant for the MENA region, since its small and medium enterprises could generate more growth and employment by having better access to finance (Lukonga et al. 2014).

In terms of history, Bordo and Meissner 2016 relate the oldest banking crises to panics, which were controlled by deposit insurance guarantees across some European countries (like the UK,

Germany and France) in the late 19th century and in 1933 in the US after the Great Depression. Sovereign debt defaults and currency crises have been tied together since the 19th century, with fiscal imbalances often triggering speculative attacks on a currency. Part of the reason was that several countries would borrow in foreign currencies to finance wars and unproductive ventures, leaving a maturity mismatch. Sudden stops of capital flows would then lead to sovereign debt default (Bordo and Meissner 2016). After World War II, banking crises have mostly been caused by insolvency in the financial system (Bordo and Meissner 2016), with overindebtedness leading to loan default during a recession and a banking crisis. Banking crises can feed into debt crises when the fiscal authorities bailout insolvent banks which then increases sovereign debt to a point where it becomes unsustainable. It is relevant to note that government bailouts of failed financial institutions during banking crises often leads to moral hazard and even worse outcomes in the future (Bordo and Meissner 2016, Laeven and Valencia 2020). The Asian crisis in 1997 and the eurozone crisis in the early 2010s are good examples of sovereign debt crises caused by banking crises. In the case of the Asian crisis the origin of the problems was a sudden stop of capital flows due to fears of overindebted banks and large corporations, which led to speculative attacks and a currency crisis followed by sovereign default. The European sovereign debt crisis was caused by large bailouts of the financial system implemented during the Great Financial Crisis. However, macroprudential policies have been shown to decrease the probability of banking crises (Nakatani 2020).

Fiscal debt crises are often tied to banking and currency crises. A fiscal crisis happens when a sovereign debtor is unable to service its bonds as scheduled. A debt crisis can then become a financial crisis when it impinges on the banking system. Debt crises can then spill into banking crises when banks hold significant amounts of sovereign debt whether by choice or because governments push banks to hold significant levels of government debt. Reinhart and Rogoff 2009 argue that domestic debt default by inflation and financial repression can have consequences as serious as external default by making authorities dependent on the inflation tax. A deep description of how sovereign debt crises are intertwined with banking crises is made in Brunnermeier and Reis 2025, with detailed descriptions of crises in Argentina, Chile, the Asian-Russian crisis, the Great Financial Crisis, the European sovereign debt crisis and even financial problems during the Covid pandemic. Brunnermeier and Reis 2025 also explain how exchange rate, monetary and fiscal policies can be

used to mitigate the worst aspects of financial crises.

Currency crises can also cause banking and sovereign debt crises. An overvalued currency peg creates incentives for banks, corporations and governments to obtain too much debt in foreign currency. When the currency suddenly depreciates, borrowers have to dedicate much more resources to debt repayment and the currency crisis turns into a banking collapse (Kaminsky and Reinhart 1999, Brunnermeier and Reis 2025) and a sovereign default (Brunnermeier and Reis 2025).

Finally, Gorton and Ordoñez 2023 provide the deepest understanding of financial crises by delving into the most basic aspects of economic theory. Loans protected by collateral provide little information on borrower quality during the economic expansion phase. A crisis happens when a credit boom transits toward an information regime with careful examination of collateral. As this examination is more valuable when collateral backs projects with low productivity, crises are more likely during booms that display larger productivity declines. Financial frictions, measured by higher bankruptcy costs, magnify the reaction of lending rates and economic activity to negative shocks and then delay their recovery by restricting information after the crisis. This asymmetry is stronger in countries with less developed financial systems. Agents can also search for too much information on negative borrowers and banks. This provides arguments for central banks to create liquidity lines for banks based on secrecy and therefore preventing stigma against borrowers. Stock markets, which aggregate both negative and positive information, can be an important macroprudential institution by preventing capital from drying up when debt markets are blocked. Herrera et al. 2020 also provide theoretical mechanisms for populist authorities to prefer riding bad credit booms rather than implementing prudential policies that are politically costly.

In terms of empirical analysis, Babecký et al. 2014 find that growth in domestic private credit is the most robust indicator of financial crises. Rose and Spiegel 2012, however, find that none of the most popular economic indicators helps to predict financial crises. Finally, a recent machine learning approach from Fouliard et al. 2023 uses around 67 variables to predict systemic financial crises twelve quarters ahead out-of-sample with high signal-to-noise ratio. However, the methodology of these previous empirical papers is unable to test for causality (Fouliard et al. 2023). Greenwood et al. 2022 also find that rapid asset prices and credit growth are a strong predictor of financial crises. Overall, there is a strong need to develop more empirical studies of financial crises, especially studies with a causal approach based on micro data (Dell'Ariccia et al. 2008, Madeira 2024b).

2.2 Consequences of financial crises

The previous literature shows that financial crises are statistically associated with a drop in output (Laeven and Valencia 2020). Using data at the level of country-industries, Dell'Ariccia et al. 2008 show that financial crises reduce manufacturing growth, especially in externally dependent industries. Kroszner et al. 2007 show that banking crises impact sectors dependent on external finance more severely in countries with a less developed financial system. Macroprudential policies can be a relevant tool to mitigate the impact of financial crises (Biljanovska et al. 2023, Madeira 2024a).

Other studies show that the effect of financial crises on output may happen through a fall in investment. The fall in investment can be caused by either a decline in domestic credit or a sudden stop in capital flows (Bordo and Meissner 2016). Using data for the period 1976–2002, Joyce and Nabar 2009 find that openness to capital flows worsens the adverse impact of banking crises on investment. The literature also finds that fiscal problems and sovereign debt crises can depress investment through a debt overhang problem (Aguiar and Amador 2014). Investors believe that the high sovereign debt level will lead to tax increases, therefore firms are less likely to invest. There is also evidence that the reputational costs of crises are not fixed, with Trebesch and Zabel 2017 showing that hard defaults imply a 2 to 4 percentage lower growth during sovereign debt crises.

Firm heterogeneity is relevant during crises. Buera and Moll 2015 show that credit crunches can show up as either efficiency, investment or labor wedges, depending on firm heterogeneity. A credit crunch shows up as an efficiency wedge if there is heterogeneity in the productivity of final goods producers. An investment wedge appears if there are heterogeneous investment costs, while there is a labor wedge with heterogeneous recruitment costs. Buera and Karmakar 2022 show that during the 2010-2012 Portuguese sovereign debt crisis, firms with higher leverage and in externally finance dependent industries contracted more their activity during the crisis. This decline in activity can be confirmed by a drop in employment, assets and total debt. The authors argue that this result cannot be explained by a simple model of leverage and financial frictions. The heterogeneity of firms' reactions during the crises can only be explained if some firms are more dependent on long-term debt and have short-term cash flow problems.

3 Data and empirical approach

3.1 Manufacturing industries

This study uses the UNIDO's Industrial Statistics Database (Indstat2 - revision 3), which contains annual frequency data for the 2-digit ISIC (International Standard Industrial Classification of All Economic Activities) industries of each country for 23 manufacturing industries. Industrial growth is measured by the log increase in the Index of Real Industrial Production (IIP), $g_{i,c,t} = \ln(\dfrac{IIP_{i,c,t}}{IIP_{i,c,t-1}})$, which accounts for sector-specific prices. The data is unbalanced, with some countries-industries reporting missing data in several years. The 102 countries include 35 advanced economies (AEs) and 67 emerging markets and developing economies (EMDEs). There are 12 MENA countries in the data: Algeria, Armenia, Egypt, Iraq, Israel, Jordan, Kuwait, Lebanon, Morocco, Oman, Tunisia, Turkey. The only MENA country among the advanced economies is Israel. The other MENA countries are EMDEs, with 6 countries being emerging markets (Algeria, Iraq, Kuwait, Lebanon, Oman, Türkiye) and 5 being developing economies (Armenia, Egypt, Jordan, Morocco, Tunisia).

Table 1: Industries and countries available in the joint industrial and macroprudential policy dataset, across advanced economies (AEs), emerging markets (EMs), developing economies (DEs) and MENA region

Industries (ISIC 2-digit revision 3) with External Finance Dependence (EFD_i) in parentheses:

15 Food and beverages (0.112), 16 Tobacco products (-0.451), 17 Textiles (0.277), 18 Wearing apparel, fur (0.029), 19 Leather, leather products and footwear (-0.113), 20 Wood products (excl. furniture) (0.283), 21 Paper and paper products (0.161), 22 Printing and publishing (0.203), 23 Coke, refined petroleum products, nuclear fuel (0.170), 24 Chemicals and chemical products (0.458), 25 Rubber and plastics products (0.634), 26 Non-metallic mineral products (0.193), 27 Basic metals (0.040), 28 Fabricated metal products (0.213), 29 Machinery and equipment n.e.c. (0.633), 30 Office, accounting and computing machinery (0.948), 31 Electrical machinery and apparatus (0.821), 32 Radio, television and communication equipment (0.975), 33 Scientific instruments, medical, precision and optical instruments (0.961), 34 Motor vehicles, trailers, semi-trailers (0.360), 35 Other transport equipment (0.328), 36 Furniture; manufacturing n.e.c. (0.235), 37 Other manufactured products and recycling (0.339).

Distribution of the share of manufacturing value-added in GDP across countries in 2019 (in %):

$Share_{i,c,t}$	min	p10	p25	p50	p75	p90	max	min	p10	p25	p50	p75	p90	max
	Total manufacturing over GDP							Largest national industry over GDP						
All countries	0.6	6.3	9.5	12.7	17.6	21.4	47.6	0.3	1.4	2.0	2.8	3.9	5.1	18.0
AEs	0.6	5.6	9.4	12.4	19.4	28.9	47.6	0.3	1.1	1.8	2.1	3.4	7.6	18.0
EMDEs	2.1	7.1	9.7	12.7	17.0	19.9	26.8	0.7	1.9	2.4	3.0	4.2	4.9	14.9
EMs	2.1	6.1	10.4	12.7	18.0	21.6	26.8	0.7	1.6	2.2	2.9	3.8	4.6	7.0
DEs	5.9	7.6	8.7	13.0	15.6	18.5	26.1	1.0	1.9	2.8	3.1	4.4	6.0	14.9
MENA	2.1	5.0	8.9	12.2	17.6	18.7	23.9	0.7	1.3	2.4	2.8	3.0	4.6	7.0

Individual industries value-added as a share of GDP in 2019 and correlation of the individual industries' real growth with real GDP growth during 1980-2019 (in %):

$Share_{i,c,t}$	p10	p25	p50	p75	p90	p95	p99	min	p10	p25	p50	p75	p90	p95
	Individual manufactures over GDP							Correlation with GDP growth						
All countries	0.04	0.1	0.3	0.7	1.5	2.4	4.6	-95.7	-11.4	15.4	41.9	63.8	77.6	82.9
AEs	0.04	0.1	0.4	0.8	1.6	2.2	5.1	-65.2	9.9	32.0	49.6	67.3	78.7	83.3
EMDEs	0.03	0.1	0.3	0.7	1.5	2.4	4.6	-95.7	-22.5	4.9	33.0	60.7	76.5	82.6
EMs	0.03	0.1	0.3	0.7	1.6	2.3	4.4	-85.9	-5.3	21.6	49.6	66.8	79.1	84.0
DEs	0.03	0.1	0.2	0.6	1.4	2.8	4.9	-95.7	-49.2	-8.7	18.2	42.1	67.6	81.4
MENA	0.01	0.1	0.2	0.6	1.3	2.4	4.4	-69.4	-18.9	-1.4	23.9	43.7	60.6	68.1

Table 1 summarizes the list of industries and countries available in the dataset. This study comprises 102 countries, including 35 AEs and 67 EMDEs. The median country produces just 12.7% of its GDP from the manufacturing sector. The data shows that even the largest industry of each country is relatively small. The largest industry of the median country produces just 2.8% of GDP. Less than 10% of the countries have an industry that represents more than 5.1% of GDP. No country has an industry that represents more than 18% of the GDP. Finally, Table 1 shows that the median industry produces just 0.3% of the GDP and has a correlation of just 42% with the national real GDP growth. The MENA countries are quite similar to the emerging markets group,

Figure 1: Distribution of the size in 2019 (as a % of GDP) of the countries' industries and the industries' annual real growth correlation with the national real GDP growth

Blue dots for AEs, green for EMDEs, orange for MENA.
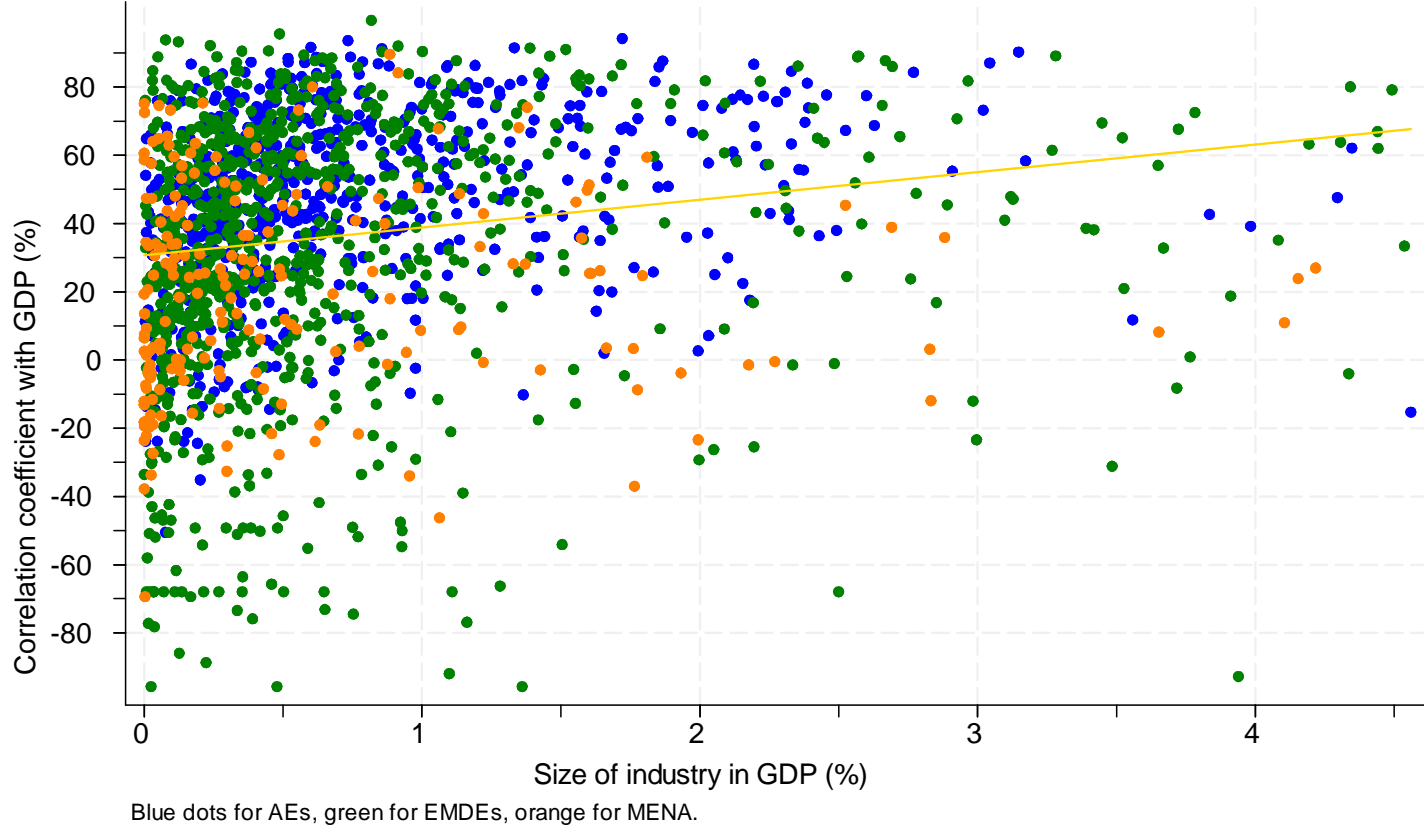
with the manufacturing sector representing between 2% and 24% of the GDP, with a median value of 12.2%. The largest manufacturing industry in the MENA countries represents between 0.7% and 7% of GDP, with a median value of 2.8%. Individual industries in the MENA represent a median value of just 0.2% of GDP and have a median correlation of just 24% with national GDP growth.

Figure 1 further develops the analysis by showing the scatter plot of the size of the individual industries and the correlation of the industries' growth with national GDP growth. The results show that 99% of the industries are much smaller than 5% of the GDP and few industries have a correlation above 80% with national activity. A linear fit shows that larger industries (as a share of GDP) also tend to be more correlated with national GDP, but even the largest industries have an average correlation with GDP of just 60%. The assumptions required for the identification mechanism in this article are, therefore, valid: i) all industries are small (the median industry
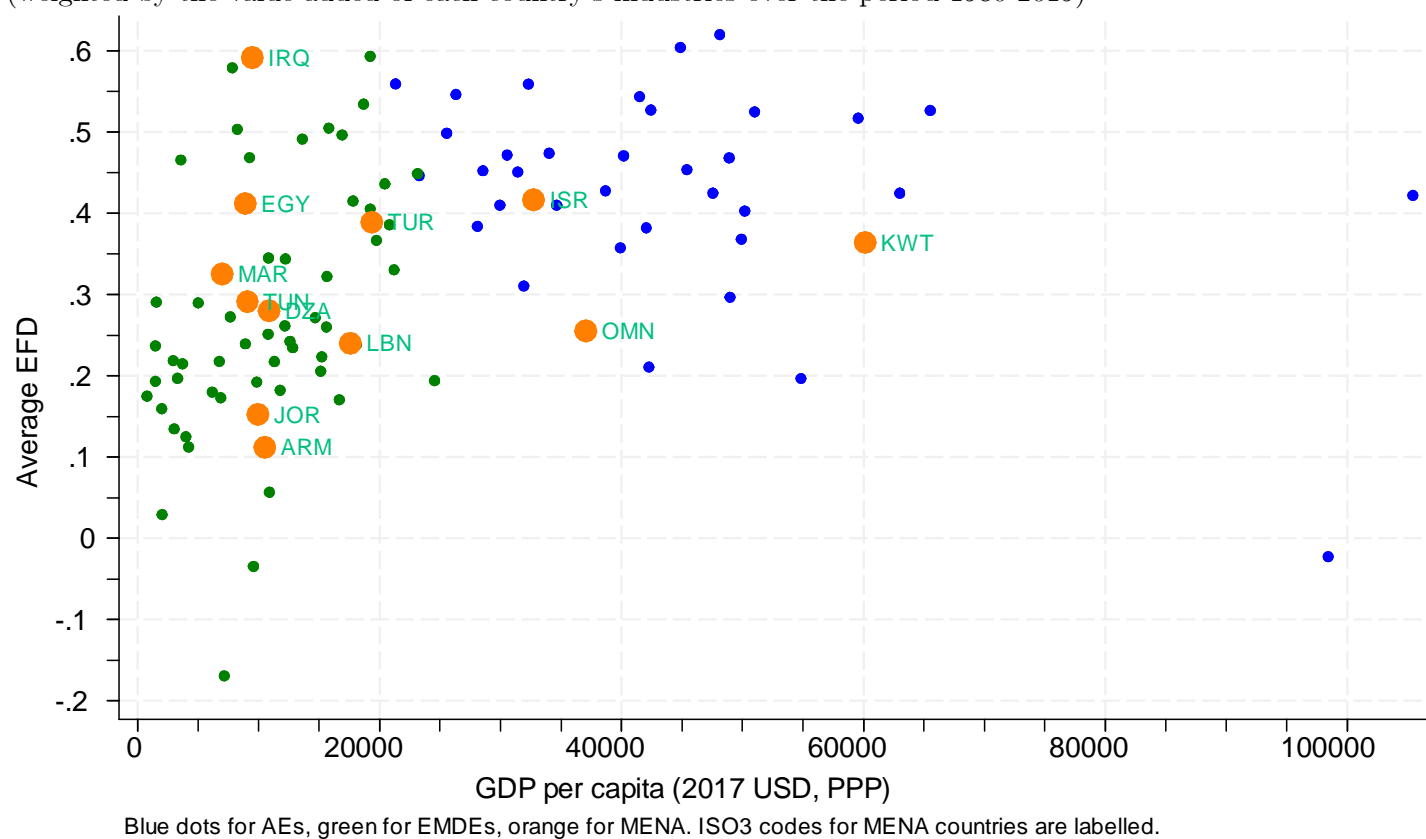
represents just 0.3% of the GDP) and not the main cause of the financial crises;[2] ii) the industries are not similar to a "representative firm" agent and have a correlation with real GDP growth that is less than 42%. Furthermore, Table A.1 in the online appendix shows regressions testing whether the lagged growth of different industries can predict financial crises (any crisis, banking, currency and sovereign debt crisis). The results show that the lagged industries growth have very small coefficients for their impact on the future financial crises and only 4 of the 23 industries have statistically significant values. This confirms that the results studied in this article are causal. Financial crises have an effect on the growth of individual industries, but not the other way around. Therefore, financial crises are exogenous events relative to the growth of individual manufacturing industries.

Finally, note that the median and average external finance dependence across the 23 industries is 0.28 and 0.34, respectively. Furthermore, the interdecile range (i.e., the percentiles 10 to 90) of the external finance dependence of the industries goes from 0.03 to 0.95. Therefore, most industries have some degree of dependence of external funds, although two industries could be said to be externally finance independent (that is, with $EFD \leq 0$).

Figure 2 shows the average external finance dependence of each county's manufacturing sector. Note that the external finance dependence changes across industries within the same country and these industries differ in size, therefore the average for the country is weighted by the value-added of each industry. It is also the case that some industries may be growing over time, while other industries are falling behind. This implies that the external finance dependence of the manufacturing sector of each country changes over time, as some industries become larger. For this reason, I analyze the average external finance dependence over the entire sample period (from 1980 to 2019) for each country's manufacturing sector. The results show that AEs tend to have manufacturing sectors with higher external finance dependence. External finance dependence fall substantial with national income, with the lowest income countries having manufacturing sectors

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[2]The small value of each individual industry relative to the national economy is crucial to insure that financial crises and other aggregate events can be taken as exogenous. For this dataset, the assumption of the exogeneity of national outcomes is realistic. Assume that the median industry, which represents just 0.3% of national GDP, has a huge crisis and loses one third of its output. Even this large industrial shock represents just 0.1% of GDP, which is unlikely to cause a national financial crisis due to such a small value at the national level. Therefore, it is reasonable to assume that financial crises impact the manufacturing industries, but not the other way around.

Figure 2: Average external finance dependence (EFD) of the manufacturing sector of each country (weighted by the value-added of each country's industries over the period 1980-2019)

Blue dots for AEs, green for EMDEs, orange for MENA. ISO3 codes for MENA countries are labelled.

with external finance dependence close to zero or even below zero. This result makes sense. Lower income countries have less developed financial markets, whether in terms of equity, corporate bonds or bank loans. Therefore, it is reasonable to expect that developing economies will only adopt industries that have low requirements of external funding. It is relevant to note, however, that there are exceptions, since there is a significant heterogeneity of manufacturing sectors across countries. For instance, in terms of the MENA countries, Iraq has the manufacturing sector with the highest external finance dependence, although countries like Lebanon, Turkey, Israel, Oman and Kuwait have a much higher GDP per capita.

3.2 Financial crises

This article uses the financial crises' dataset published by Laeven and Valencia 2020. This dataset includes the dates of the financial crises for each country. The data also includes estimates of the increase in public debt and the GDP losses implied by each banking crisis, which are estimated using the GDP trend growth before the financial crisis happened. The financial crisis dates of this dataset were extended until 2019 by Nguyen et al. 2022. Note that 9 countries (in a sample of 102 countries) had zero financial crises over the sample period (1980 to 2019). Furthermore, there were 22, 41 and 65 countries with zero banking, currency and sovereign debt crises, respectively. Therefore, the average country frequency of financial crises can be below one, especially for some country groups such as the AEs.

Figure 3 shows that financial crises are more common among EMDEs, with the average EMDE having faced 3.5 financial crises during the study period. The average AE and MENA countries experienced less than 1.5 and 2.5 financial crises, respectively. In fact, EMDEs experience more crises of any type, whether banking, currency or sovereign debt crises. The average AE and MENA countries experienced 0.9 banking crises, slightly less than the average 1.05 banking crises of the EMDEs. Both EMDEs and MENA countries are much more likely to experience currency and sovereign debt crises than AEs. The average AE experienced only 0.4 currency and 0.1 sovereign debt crises. MENA countries experienced 1.25 currency and 0.6 sovereign debt crises. The EMDEs experienced 1.5 currency and 1.3 sovereign debt crises.

Figure 4 summarizes the average GDP loss and increase in public debt for the banking crises

Figure 3: Average countries' frequency of financial crises: 1980-2019

Financial crises

Banking crises

Currency crises

Sovereign debt crises
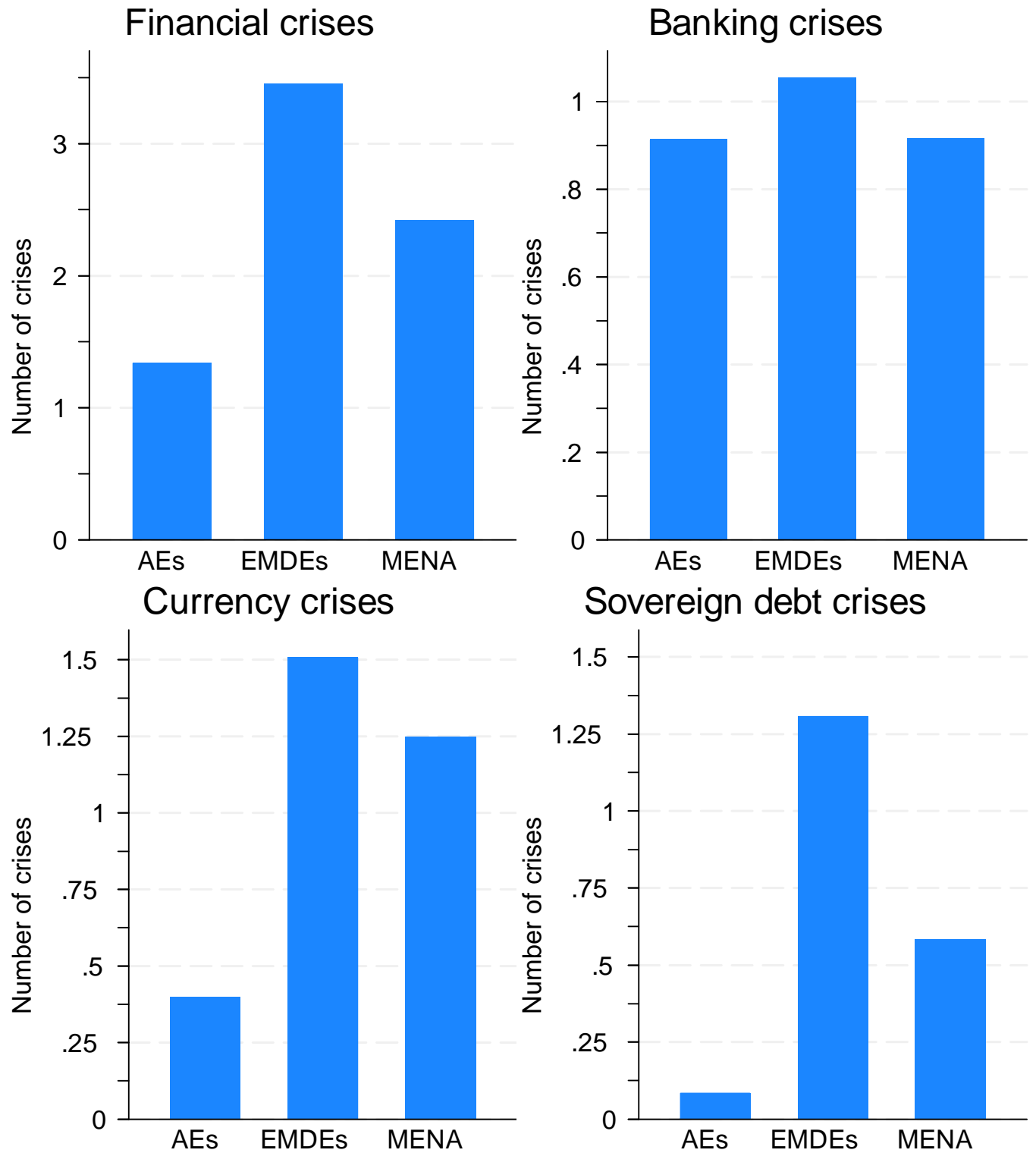
Bars for AEs and EMDEs do not include the MENA.

Figure 4: Average GDP loss and increase in public debt during banking crises (estimates from Laeven and Valencia 2020)
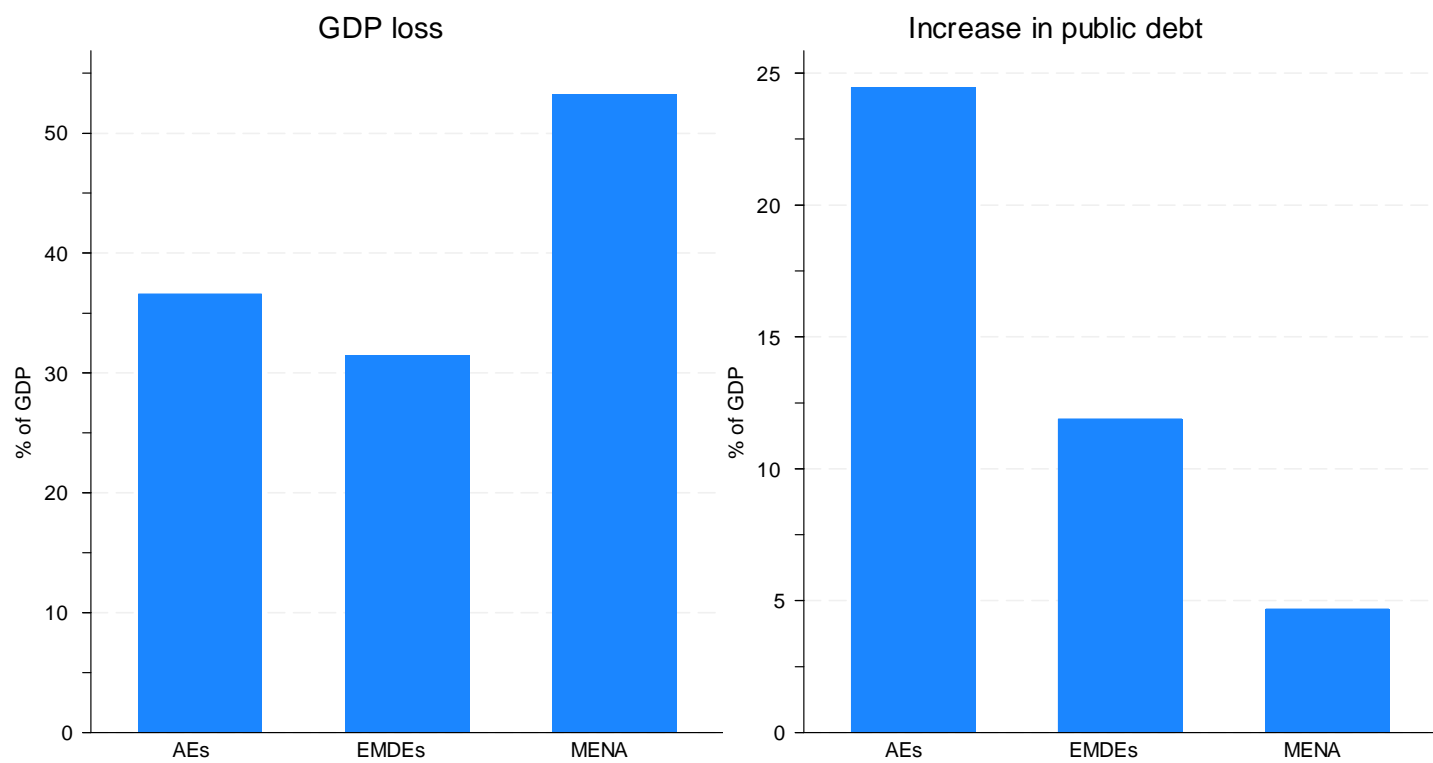
Bars for AEs and EMDEs do not include the MENA.

in the average country (estimates from Laeven and Valencia 2020). Note that these results are for the period between 1980 and 2017, since these variables were not updated afterwards. Perhaps one reason is that both variables depend on the estimated trend for the GDP and public debt. Trend estimates tend to be sensitive to the last periods of the sample, which therefore justifies not having estimates for the more recent years. Interestingly, the MENA face much bigger GDP losses during banking crises, although their governments spend much less in solving the crises. The results show that the average MENA country experiences an average 53% GDP loss during a banking crisis, while their public debt increases by just 4.7% of GDP. AEs and EMDEs experience 37% and 31% GDP losses during banking crises. However, AEs spend much more to mitigate the negative effects of banking crises, with an increase of public debt of 24% of GDP relative to just 12% in EMDEs.

Finally, Table 2 summarizes the experience with financial crises for all the MENA countries. Turkey, Egypt and Morocco were the countries that experienced more financial crises, with 7, 5 and 4 events, respectively. It is also noticeable that these 3 countries and Jordan experienced all the types of financial crises (banking, currency, sovereign debt). Iraq and Oman were the only countries that never experienced a financial crisis. Kuwait, Jordan and Lebanon experienced the worst banking crises in terms of output loss, with losses above 100% of GDP. Note that this Table does not include the most recent financial crisis that started in Lebanon in 2021. In terms of fiscal resources used during banking crises, Morocco implemented the strongest government interventions, having increased its public debt by an average of 36% of GDP. Algeria, Kuwait and Turkey also implemented fiscal interventions around 19%, 16% and 14% of GDP. Jordan and Egypt had the most austere fiscal policies during banking crises, having reduced its public debt after such events.

Table 2: Financial crises experienced by the MENA countries (1980 until 2019)

| Country | Number of financial crises | | | | Average changes in banking crises | |
	All crises	Banking crises	Currency crises	Sovereign debt crises	GDP loss (% of GDP)	Increase in public debt (% of GDP)
Armenia	1	1	0	0		
Algeria	3	1	2	0	41	19
Egypt	5	1	2	2	1	-4
Iraq	0	0	0	0		
Israel	3	1	2	0	43	
Jordan	2	1	1	2	106	-61
Kuwait	1	1	0	0	143	16
Lebanon	2	1	2	0	102	
Morocco	4	1	1	2	22	36
Oman	0	0	0	0		
Tunisia	1	1	0	0	1	4
Turkey	7	2	5	1	36	14

Overall, this section shows that MENA countries face much fewer financial crises of any type relative to the other EMDEs. However, MENA countries face much bigger GDP losses during banking crises, relative to either AEs and EMDEs. During banking crises, MENA countries also increase their public debt much less than either AEs and EMDEs. This may show that public authorities in MENA countries should invest more in their fiscal framework in order to be better prepared to mitigate the negative effects of financial crises.

3.3   Empirical model

The effect of crises on the growth of different industries can be understood using the financial frictions model of Braun and Larrain 2005. Let the industry output Y_i be given by a production function $F(x_i)$ that is increasing and concave in the variable input x_i. The production function also includes a technology parameter θ_i, which can denote other inputs that are fixed. Firms of industry i maximize their profits π_i conditional on using internal funds (W_i) and external capital (E_i):

1) $\max \pi_i = Y_i - r_W W_i - r_E E_i = \theta_i F(x_i) - r_W W_i - r_E E_i$, s.t. $x_i \leq \beta_s W_i + E_i$.

W_i denotes the internal funds available to firms in industry i, while E_i denotes external funds that must be obtained in capital markets (either through banks or asset markets). The parameter

β_s denotes the state of the economy, which is weaker during crises, that is, $\beta_{normal} > \beta_{crisis}$. In a Modigliani-Miller world there is no difference between the cost of internal (W_i) and external (E_i) funds. However, the literature presents evidence that external funds (E_i) are more expensive due to agency problems such as borrower default, therefore $r_E > r_W$. Firms that have no external finance dependence (that is, $E_i = 0$) use the optimal input amount of $x_i^* = \frac{1}{\theta_i} F'^{-1}(r_W)$, which is higher than for firms that require external funds (i.e., $E_i > 0$). Crises, such as recessions and financial crises, decrease even more the internal funds available and therefore hurt even more the industries that use external funds (Braun and Larrain 2005).

The empirical approach consists of exploiting the differential behavior of each industry in the same sample of countries across periods with financial crises or not. I estimate a panel data model of the real growth rate, $g_{i,c,t}$, for the industry i in country c at the time t, using an additive-linear form:

2) $g_{i,c,t} = \gamma EFD_i \times BankCrisis_{c,t} \times MENA_c + \alpha Share_{i,c,t-1} + \delta x_{c,t} + f_{i,c} + f_t + \varepsilon_{i,c,t},$

with $BankCrisis_{c,t}$ being a dummy denoting a banking crisis in country c at time t, EFD_i the external financial dependence of industry i, $Share_{i,c,t-1}$ is the fraction of value-added of industry i in the total manufacturing of the country in the previous year[3], $f_{i,c}$ is industry-country fixed effects, f_t time fixed effects, $x_{c,t}$ is a vector of additional time-varying controls and $\varepsilon_{i,c,t}$ is an idiosyncratic unobservable term. $MENA_c$ is a dummy denoting the MENA countries. The estimation is performed using a panel estimator for models with a large number of fixed effects[4], using industry-country clusters and time dummies. The vector of time-varying controls $x_{c,t}$ includes variables such as the log of the income per capita $(\ln(GDP_{c,t}^{PPP,pc}))$, inflation rate $(inflation_{c,t})$, the real GDP growth $(g_{c,t}^{GDP})$ and the monetary policy rate $(MPR_{c,t})$, with both values for the current year (t) and the previous one $(t-1)$. Since financial crises also affect GDP growth and inflation, I first estimate the models without these two variables to get a better sense of the entire effect of the financial crises on manufacturing industries.[5] A second set of regressions shows the effect of financial crises, even after accounting for GDP growth, inflation and monetary policy rates.

[3] This variable is used in previous studies to account for larger and more developed industries growing gradually less over time (Braun and Larrain 2005, Kroszner et al. 2007, Cowan and Raddatz 2013).

[4] The Stata commands xtreg or reg with industry-country and time fixed effects give exactly the same coefficient estimates and almost exactly the same standard errors as the Correia command.

[5] In an online appendix I show that the results remain similar after controlling for the real GDP growth and

I also consider an additional robustness checks that includes country-industry and country-year dummies:

3) $g_{i,c,t} = \gamma EFD_i \times BankCrisis_{c,t} \times MENA_c + \alpha Share_{i,c,t-1} + f_{i,c} + f_{c,t} + \varepsilon_{i,c,t}.$

Finally, I estimate a model with 3 pairs of fixed effects, which include country-industry, country-year and industry-year dummies:

4) $g_{i,c,t} = \gamma EFD_i \times BankCrisis_{c,t} \times MENA_c + \alpha Share_{i,c,t-1} + f_{i,c} + f_{c,t} + f_{i,t} + \varepsilon_{i,c,t}.$

The main hypothesis in this empirical analysis is that industries with higher external finance dependence suffer a larger reduction in growth during financial crises, that is, $\gamma < 0$. This hypothesis has been tested before and found to be plausible during banking crises (Dell'Ariccia et al. 2008, Madeira 2024b), currency crises (Madeira 2024b), sovereign debt crises (Madeira 2024b), recessions (Braun and Larrain 2005) and sudden stops (Cowan and Raddatz 2013). The novelty in this work is that I test for whether this effect differs between MENA and other countries, whether advanced or developing economies.

Furthermore, it is also expected that financial crises have a negative effect on all industries, even those without external finance dependence. This effect is estimated by including the dummies for financial crises ($BankCrisis_{c,t}$, $CurrencyCrisis_{c,t}$, $DebtCrisis_{c,t}$) in the vector $x_{c,t}$ in equation 2. Therefore, it is expected that the coefficients $\delta_{BankCrisis_{c,t}}$, $\delta_{CurrencyCrisis_{c,t}}$ and $\delta_{DebtCrisis_{c,t}}$ are negative. This can be interpreted as a demand effect, since if aggregate demand falls then output should fall even in industries that are immune to financial frictions. This hypothesis has been confirmed in the previous literature (Madeira 2024b), but this work introduces the novelty of studying whether MENA countries differ from the others.

Other controls are also included in the model. It is expected that larger industries relative to the economy already consume a significant share of resources and have already converged to

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inflation and its lags. But in this case the interpretation for the isolated coefficient dummy $BankCrisis_{c,t}$ changes. The reason is that $BankCrisis_{c,t}$ also affects GDP growth and inflation. Therefore, adding these controls implies that the coefficient is estimating the effect of banking crises on manufacturing growth, after its effect on economic output is already accounted for. For this reason, the coefficient of $BankCrisis_{c,t}$ on manufacturing growth tends to be small and insignificant. However, the coefficients for $EFD_i \times BankCrisis_{c,t}$ remain similar after accounting for real GDP growth, inflation and its lags.

their steady-state. Therefore, larger industries should grow less over time, which is captured by the coefficient α being negative. The three sets of fixed effects $(f_{i,c}, \; f_{c,t}, \; f_{i,t})$ control for other unspecified shocks affecting firm performance, including the severity of the crises, countries' financial development, global shocks to the industry and aggregate country-specific shocks. These are ancillary parameters that are differenced out in the regression command and therefore are not estimated. These controls are included in the traditional empirical literature that uses the UNIDO dataset (see Braun and Larrain 2005, Dell'Ariccia et al. 2008, Cowan and Raddatz 2013).

Note that both the model with a double pair of fixed effects and the triple pair fixed effects model have a similar reasoning as the difference-in-difference estimators (Dell'Ariccia et al. 2008). In some sense the coefficient γ is comparing industries with a high external finance dependence (EFD_i) with other industries with no financial dependence in the same country and at the same time. There is not a need to specify a given control group, since all the other industries with different levels of external finance dependence are control groups. Note that the comparison with the difference-in-difference model is easier when we compare industries with an EFD_i close to one with other industries with an EFD_i close to zero. There are no industries with an EFD_i that is exactly one or zero. However, there are very close cases to those extreme examples, as shown in Table 1. Industries 8 (Wearing apparel, fur) and 27 (Basic metals) have EFD_i very close to zero, with values below 0.04. Industries 30 (Office, accounting and computing machinery), 33 (Scientific instruments, medical, precision and optical instruments) and 32 (Radio, television and communication equipment) have EFD_i very close to one, with values above 0.948. However, the double and triple fixed effect models do not have to rely on a specific treatment and control groups, since all the other industries with different EFD_i are control groups. However, the coefficient γ can be interpreted as representing the treatment for an industry with an EFD_i of one versus an industry with zero external finance dependence (Dell'Ariccia et al. 2008). Furthermore, this specification is clear about the channel in which the treatment groups are affected by the financial crisis treatment, which is their external finance dependence channel.

As a robustness check, I also estimate the model of equation 2 by panel quantile regressions. Quantile regressions are robust to outliers and also inform on whether there are differential effects during low (quantile 25), median (quantile 50) or high (quantile 75) growth periods. Panel quantile regressions also take into account that financial crises can have a different effect on industries,

depending if industries are in periods of high or low growth. Quantile regressions have consistency problems with large numbers of coefficients such as fixed effects. However, Machado and Santos Silva 2019 provide a panel data quantile regression model that is consistent with industry-country fixed effects. The model is still inconsistent if the researcher adds a large number of controls that cannot be differenced out. Therefore this model, besides the industry-country fixed effects, includes just dummies for the Great Moderation (1988-2006) and GFC (2007-2009) instead of year dummies.

3.4 Variables used in the study and available files for replication

Table 3 summarizes all the variables used in this article and their sources. All the data used in this article is publicly available and free of cost. It is worth noting that the dummies for banking, currency, sovereign debt and any financial crisis in this article come from Laeven and Valencia 2020 for the period between 1980 to 2017, but these measures are updated with data from Nguyen et al. 2022 until 2019. Furthermore, all the software codes required to replicate the analysis are available in a Mendeley Data link: https://data.mendeley.com/datasets/px7snnvypr/1 .

Table 3: Main industry and country variables used in the article and their sources

Variable	Description	Source
$g_{i,c,t}$	Growth rate of the real production index of the manufacturing industry i in country c in year t	UNIDO
$ShareManVA_{i,c,t}$	Value-added of manufacture i as a fraction of the total manufacturing value-added of country c in year t	UNIDO
$MPR_{c,t}$	Monetary policy rate of country c in year t (mean yearly value)	IMF & BIS
$GDP_{c,t}^{PPP,pc}$	GDP per capita of country c in year t (2017 USD in PPP)	World Bank
$g_{c,t}^{GDP}$	Real GDP growth rate of country c in year t	World Bank
$inflation_{c,t}$	Consumer Price Index inflation of country c in year t	World Bank
$BankCrisis_{c,t}$	Dummy with value 1 if country c in year t is facing a banking crisis, 0 otherwise (Laeven and Valencia 2020, Nguyen et al 2022)	Laeven & Valencia
$CurrencyCrisis_{c,t}$	Dummy with value 1 if country c in year t is facing a currency crisis, 0 otherwise (Laeven and Valencia 2020, Nguyen et al 2022)	Laeven & Valencia
$DebtCrisis_{c,t}$	Dummy with value 1 if country c in year t is facing a sovereign debt crisis, 0 otherwise (Laeven and Valencia 2020, Nguyen et al 2022)	Laeven & Valencia
$AnyCrisis_{c,t}$	Dummy with value 1 if country c in year t is facing a financial crisis, 0 otherwise (Laeven and Valencia 2020, Nguyen et al 2022)	Laeven & Valencia
$Crisis$ $OutputLoss_{c,t}$	Output loss given by the cumulative sum of the difference between actual and trend real GDP over the period [T, T+3], in % of GDP	Laeven & Valencia
$Crisis$ $Duration_{c,t}$	Duration (in years) of the financial crisis.	Laeven & Valencia
EFD_i	External Finance Dependence index of manufacture i: the fraction of capital expenditures of the median firm that is not financed with cash-flow: (capital expenditures-cash-flow)/capital expenditures. Calculation for the US firms in Compustat between 1980 and 1989.	Rajan & Zingales (1998)

4 Main results

The main results of the article are shown in Table 4, with three versions of the model being estimated: i) with controls; ii) with added controls for current and past inflation rates, GDP growth, and changes in the monetary policy rate in the current and previous years; iii) with country-year fixed effects (which keeps just the controls available at the country-industry-year level). All the models in this article have industry-country and year fixed effects. Note that the monetary policy rate variable is not available for all countries and periods, therefore that sample is considerably smaller than for the regressions with just macro controls or country-year fixed effects. Furthermore, there are model estimates using the entire sample of countries (102 countries) and for the EMDEs

sample (67 countries) which is more similar to the MENA countries. These controls help to control for unobserved components that may affect the industries of each country and also for global shocks such as the international financial cycle or the Great Financial Crisis that affected most countries across the globe.

Table 4: Effects of banking crises on industrial growth across all countries and EMDEs

Controls	With macro controls		With monetary policy		W/ country-year fixed effects	
	All countries	EMDEs	All countries	EMDEs	All countries	EMDEs
$1(MENA_c = 0)\times$	-3.321***	-7.451***	-2.408**	-9.042***	-3.406***	-7.104***
$EFD_i \times BankCrisis_{c,t}$	(1.080)	(1.780)	(1.161)	(1.987)	(0.983)	(1.533)
$1(MENA_c = 1)\times$	-5.928	-8.297	-15.08**	-17.99***	-8.137*	-8.263*
$EFD_i \times BankCrisis_{c,t}$	(4.627)	(5.111)	(6.145)	(6.307)	(4.507)	(4.911)
$ShareManVA_{i,c,t-1}$	-0.164***	-0.193***	-0.284***	-0.311***	-0.154***	-0.177***
	(0.0359)	(0.0492)	(0.0546)	(0.0924)	(0.0331)	(0.0445)
$\ln(GDP^{PPP,pc}_{c,t-1})$	-6.874***	-6.089***	-5.171***	-4.474***		
	(0.597)	(1.050)	(0.920)	(1.458)		
$inflation_{c,t}$			0.0340**	0.0415***		
			(0.0147)	(0.0148)		
$g^{GDP}_{c,t}$			1.172***	1.247***		
			(0.0601)	(0.0882)		
$inflation_{c,t-1}$			-0.0282**	-0.0331***		
			(0.0118)	(0.0119)		
$g^{GDP}_{c,t-1}$			-0.195***	-0.231***		
			(0.0463)	(0.0622)		
$BankCrisis_{c,t}$	-2.389***	-0.799	-0.247	1.521*		
	(0.395)	(0.640)	(0.441)	(0.788)		
$\Delta MPR_{c,t}$			-0.00921**	-0.0108***		
			(0.00394)	(0.00397)		
$\Delta MPR_{c,t-1}$			-0.000354	-0.000224		
			(0.000272)	(0.000371)		
$\Delta MPR_{c,t-2}$			0.000367	0.000612**		
			(0.000233)	(0.000244)		
N	41,648	21,324	26,906	11,668	41,980	21,412
R^2 (overall)	0.142	0.105	0.240	0.200	0.315	0.289

Robust standard errors in (). Clusters by industry-country.

***,**,* denote 1%, 5%, 10% statistical significance.

All regressions include fixed effects by industry-country and year (omitted).

The results show that banking crises have a negative effect on industrial growth both on non-MENA and MENA countries. For an industry with full external finance dependence (i.e., with $EFD_i = 1$), a banking crisis implies a reduction in growth of 3.3% and 5.9% for non-MENA

and MENA countries, respectively. Banking crises also imply an additional growth reduction of 2.4% for all industries. Although the MENA effects are not statistically significant in the regressions with macro controls, the banking crises effect is statistically significant for both non-MENA and MENA countries with either monetary policy or country-year fixed effects. The negative effects of banking crises are even stronger in the regressions restricted to the EMDEs. Fully dependent industries (i.e., with $EFD_i = 1$) in EMDEs experience a growth reduction of 7.5% for non-MENA and 8.3% for MENA countries. The direct effect of banking crises on all industries, however, in EMDEs is small and statistically insignificant.

In the case of the country-year fixed effects models, a banking crisis reduces industrial growth of a full externally dependent industry (EFD=1) by 3.4% and 8.1% for non-MENA and MENA countries. Restricting the sample to the EMDEs, the negative growth effect of a banking crisis becomes 7.1% and 8.2% for non-MENA and MENA members. The regressions with controls for monetary policy show a much stronger negative effect of a banking crisis in the MENA countries. One possible interpretation is that monetary authorities in MENA countries are able to avert an even worse economic catastrophe by using the available monetary tools. Since some MENA countries have used currency pegs in the past, maybe one possibility is that during the banking crisis the authorities drop the exchange rate peg in order to pursue a more independent monetary policy.

Finally, Table 4 also shows that there is a reduction in industrial growth as countries converge to higher development levels (as measured by GDP per capita) and that industrial growth is strongly associated with the contemporaneous national GDP growth. As expected, industries with a large share of the national manufacturing value added exhibit a lower growth, since such industries are already mature, large and may have exhausted their growth opportunities. Furthermore, the regressions with monetary policy controls show that current inflation increases industrial growth, while past inflation decreases it. Increases in the current year's monetary policy rate decrease industrial growth, but have no effect after one or two years. These results are consistent with what is expected from traditional macroeconomic models in which inflation influences growth due to price rigidities and increases in the monetary policy rate reduce growth momentarily (Frankel 2010). Increases in the monetary policy rate may even have a positive effect after a two year lag as the inflation is kept under control and the economy recovers.

Table 5: Effects of banking crises on industrial growth,
with controls for monetary, fiscal and liquidity policies

Controls	With monetary policy		W/ country-year fixed effects	
	All countries	EMDEs	All countries	EMDEs
$1(MENA_c = 0)$ interaction:				
$EFD_i \times$	-8.592***	-16.36***	-3.857*	-2.875
$BankCrisis_{c,t}$	(1.681)	(3.349)	(2.065)	(3.908)
$EFD_i \times Crisis$	-0.00934	0.102	-0.0564	-0.0410
$OutputLoss_{c,t}$	(0.0379)	(0.0618)	(0.0407)	(0.0622)
$EFD_i \times Crisis$	1.881***	0.955	0.780	-1.542
$Duration_{c,t}$	(0.583)	(1.134)	(0.747)	(1.450)
$1(MENA_c = 1)$ interaction:				
$EFD_i \times$	-15.17**	-17.28***	-13.43	-13.50
$BankCrisis_{c,t}$	(6.076)	(6.240)	(8.518)	(8.563)
$EFD_i \times Crisis$			0.0165	0.00900
$OutputLoss_{c,t}$			(0.0917)	(0.0925)
$EFD_i \times Crisis$			2.939	3.404
$Duration_{c,t}$			(2.239)	(2.095)
Controls with no interactions:				
$ShareManVA_{i,c,t-1}$	-0.284***	-0.309***	-0.125***	-0.173***
	(0.0588)	(0.101)	(0.0415)	(0.0465)
$\ln(GDP_{c,t-1}^{PPP,pc})$	-6.046***	-6.010***		
	(1.048)	(1.704)		
$inflation_{c,t}$	0.0330**	0.0343**		
	(0.0150)	(0.0155)		
$g_{c,t}^{GDP}$	1.189***	1.245***		
	(0.0618)	(0.0917)		
$inflation_{c,t-1}$	-0.0275**	-0.0271**		
	(0.0121)	(0.0126)		
$g_{c,t-1}^{GDP}$	-0.213***	-0.248***		
	(0.0482)	(0.0667)		
$BankCrisis_{c,t}$	-0.302	1.028		
	(0.458)	(0.831)		
$\Delta MPR_{c,t}$	-0.00893**	-0.00918**		
	(0.00402)	(0.00416)		
$\Delta MPR_{c,t-1}$	-0.000322	-0.000505		
	(0.000291)	(0.000361)		
$\Delta MPR_{c,t-2}$	0.000360	0.000509**		
	(0.000240)	(0.000254)		
N	24,185	10,195	38,589	19,451
R^2 (overall)	0.261	0.216	0.330	0.297

Robust standard errors in (). Clusters by industry-country.

***,**,* denote 1%, 5%, 10% statistical significance.

All regressions include fixed effects by industry-country and year (omitted).

Now I extend the main specification to include controls for the severity of the banking crises as given by its total effect on GDP output and its duration in years (Laeven and Valencia 2020). Table 5 again confirms that banking crises have a negative effect on non-MENA and MENA countries in a variety of regression specifications. The results for the MENA countries (which represent a small sample of 12 countries) are not statistically significant with country-year fixed effects, although the coefficients are large and economically sizeable. Again, the coefficients show that the MENA industries experience a much bigger drop in industrial growth after a banking crisis. The results also show that a longer crisis has a mitigating effect by increasing industrial growth (presumably, as industries have more time to adapt to the banking crises and its financial frictions. Again, the regression estimates with monetary policy are consistent with traditional macroeconomic models (Frankel 2010). Higher inflation in the current year influences growth due to price rigidities, while increases in the monetary policy rate reduce growth momentarily. Monetary policy has a positive growth effect after a two year lag as the inflation is kept under control and the economy recovers.

5 Effects of other types of financial crises on industrial growth

Now I analyze the effects of other financial crisis, including currency crises and sovereign debt crises. Banking and currency crises are much more common than sovereign debt crises (Laeven and Valencia 2020), therefore the latter have fewer observations and more imprecise results. Table 6 first shows the panel data model estimates for the growth effect of a currency or sovereign debt crisis separately, then an estimate for any type of financial crisis (banking, currency or sovereign debt) and, finally, the effects of the different financial crises estimated in the same model.

The reduction of industrial growth for a fully externally dependent industry (i..e, $EFD = 1$) in the models with only one type of financial crisis vary between 2.9% and 4.9% for the non-MENA countries and between 0.8% and 5.6% for the MENA countries. The effects for non-MENA countries and of currency crises in MENA are statistically significant. However, the coefficients for banking and sovereign debt crises on MENA countries are not statistically significant, possibly due to the small number of events of this type of crisis. For currency crises, the models with macroeconomic controls indicate that a fully external dependent industry experiences a reduction in growth of 4.9% for non-MENA and 5.6% for MENA countries.

Table 6: Effects of different types of financial crises (banking, currency, sovereign debt, any financial crisis), across the entire country sample

Controls	With macroeconomics controls				With monetary policy (coefficients omitted)			
$1(MENA_c = 0)$ interaction:								
$EFD_i \times Banking\ Crisis_{c,t}$				-2.917***				-2.221*
				(1.100)				(1.168)
$EFD_i \times Currency\ Crisis_{c,t}$	-4.938***			-3.454*	-1.755			-0.714
	(1.764)			(1.815)	(1.829)			(1.802)
$EFD_i \times Sovereign\ DebtCrisis_{c,t}$		-3.365**		-2.063		-3.724		-3.193
		(1.509)		(1.469)		(2.513)		(2.533)
$EFD_i \times Any\ Crisis_{c,t}$			-2.929***				-2.507**	
			(0.923)				(1.017)	
$1(MENA_c = 1)$ interaction:								
$EFD_i \times Banking\ Crisis_{c,t}$				-3.286				-13.24**
				(4.617)				(5.671)
$EFD_i \times Currency\ Crisis_{c,t}$	-5.616*			-5.563*	-8.351***			-6.991**
	(3.205)			(3.253)	(2.950)			(2.731)
$EFD_i \times Sovereign\ DebtCrisis_{c,t}$		-0.828		-0.498		-3.923		-0.597
		(2.240)		(2.155)		(5.038)		(5.281)
$EFD_i \times Any\ Crisis_{c,t}$			-2.734				-7.968***	
			(2.120)				(2.573)	
Controls with no interactions:								
$ShareManVA_{i,c,t-1}$	-0.163***	-0.164***	-0.168***	-0.165***	-0.281***	-0.280***	-0.285***	-0.284***
	(0.0356)	(0.0357)	(0.0360)	(0.0359)	(0.0542)	(0.0541)	(0.0547)	(0.0546)
$\ln(GDP^{PPP,pc}_{c,t-1})$	-6.121***	-6.840***	-7.066***	-6.503***	-5.096***	-5.214***	-5.510***	-5.573***
	(0.584)	(0.601)	(0.605)	(0.603)	(0.923)	(0.940)	(0.934)	(0.941)
$inflation_{c,t}$					0.0429***	0.0321**	0.0358**	0.0409***
					(0.0145)	(0.0148)	(0.0145)	(0.0147)
$g^{GDP}_{c,t}$					1.180***	1.197***	1.157***	1.149***
					(0.0591)	(0.0589)	(0.0601)	(0.0605)
$inflation_{c,t-1}$					-0.0360***	-0.0270**	-0.0295**	-0.0334***
					(0.0117)	(0.0119)	(0.0117)	(0.0119)
$g^{GDP}_{c,t-1}$					-0.170***	-0.180***	-0.190***	-0.192***
					(0.0459)	(0.0461)	(0.0458)	(0.0463)
$BankCrisis_{c,t}$				-1.772***				-0.298
				(0.406)				(0.442)
$CurrencyCrisis_{c,t}$	-5.250***			-4.800***	-0.385			-0.505
	(0.786)			(0.816)	(0.675)			(0.672)
$DebtCrisis_{c,t}$		-1.201**		-0.435		0.107		0.0272
		(0.480)		(0.490)		(0.778)		(0.786)
$AnyCrisis_{c,t}$			-2.375***				-0.431	
			(0.360)				(0.387)	
N	41,648	41,648	41,648	41,648	26,906	26,906	26,906	26,906
R^2 (overall)	0.145	0.139	0.143	0.147	0.239	0.239	0.240	0.240

Robust standard errors in (). Clusters by industry-country.

***,**,* denote 1%, 5%, 10% statistical significance.

The last 4 columns include $\Delta MPR_{c,t}$, $\Delta MPR_{c,t-1}$ and $\Delta MPR_{c,t-2}$, but the coefficients are omitted.

All regressions include fixed effects by industry-country and year (omitted).

An unspecified type of financial crisis implies a reduction in growth of 2.9% for non-MENA and 2.7% for MENA countries. When all types of financial crisis' effects are put together, the panel data model shows that currency crisis are worse than either banking or sovereign debt crises for both non-MENA and MENA countries. For non-MENA countries there is a reduction in growth of 2.9% for a banking crisis and 3.5% for a currency crisis. For MENA countries the stronger effect of a currency crises is even clearer, with banking and currency crises causing a growth reduction on fully dependent industries of 3.3% and 5.6%, respectively. Furthermore, all types of crises imply an additional reduction in growth on all industries. In the model with all crises included, there is a direct growth reduction on all industries of 1.7%, 4.8% and 0.4% for banking, currency and sovereign debt crises, respectively.

Accounting for monetary policy makes the effects of currency or a general financial crises even worse for the MENA countries. This result, however, does not seem to happen among non-MENA countries. After accounting for monetary policy, there is a reduction in industrial growth (for EFD=1) of 8.4% and 8.0% during, respectively, currency and any kind of financial crises in MENA countries. A similar effect was observed for banking crises in MENA countries in Table 4 and is also present with all the types of crisis estimated in the same model in Table 6. This could be due to many MENA countries having overvalued exchange rate pegs, which are dropped during a currency crisis in favor of a more flexible monetary policy.

Finally, the results in Table 6 again confirm that industrial growth is lower for more developed countries (as measured by GDP per capita) and industries with a higher share of the manufacturing value-added (with their size and maturity implying perhaps fewer growth opportunities). Industrial growth is also positively associated with higher GDP growth, with a coefficient slightly bigger than one indicating that manufacturing industries are more pro-cyclical than the national economy.

Table 7: Effects of different types of financial crises (banking, currency, sovereign debt, any financial crisis), for the EMDE country sample

Controls	With macroeconomics controls				With monetary policy (coefficients omitted)			
$1(MENA_c = 0)$ interaction:								
$EFD_i \times Banking\ Crisis_{c,t}$			-6.264***					-8.676***
			(1.893)					(2.060)
$EFD_i \times Currency\ Crisis_{c,t}$	-6.284***		-4.354**		-3.220*			-0.781
	(1.918)		(2.051)		(1.900)			(1.920)
$EFD_i \times Sovereign\ DebtCrisis_{c,t}$		-3.070**	-0.852			-3.602		-1.570
		(1.539)	(1.492)			(2.298)		(2.361)
$EFD_i \times Any\ Crisis_{c,t}$				-4.676***			-7.324***	
				(1.351)			(1.543)	
$1(MENA_c = 1)$ interaction:								
$EFD_i \times Banking\ Crisis_{c,t}$			-6.059					-16.20***
			(5.022)					(5.846)
$EFD_i \times Currency\ Crisis_{c,t}$	-5.162		-4.597		-8.732***			-6.939**
	(3.298)		(3.349)		(3.007)			(2.810)
$EFD_i \times Sovereign\ DebtCrisis_{c,t}$		-0.291	-0.0753			-2.432		0.821
		(2.302)	(2.248)			(5.128)		(5.356)
$EFD_i \times Any\ Crisis_{c,t}$				-2.845			-8.585***	
				(2.258)			(2.703)	
Controls with no interactions:								
$ShareManVA_{i,c,t-1}$	-0.193***	-0.196***	-0.198***	-0.193***	-0.316***	-0.314***	-0.314***	-0.312***
	(0.0490)	(0.0490)	(0.0497)	(0.0493)	(0.0916)	(0.0912)	(0.0927)	(0.0925)
$\ln(GDP^{PPP,pc}_{c,t-1})$	-5.503***	-6.385***	-6.310***	-5.505***	-4.635***	-4.846***	-4.748***	-4.661***
	(1.031)	(1.064)	(1.066)	(1.055)	(1.433)	(1.462)	(1.424)	(1.484)
$inflation_{c,t}$					0.0462***	0.0402***	0.0417***	0.0443***
					(0.0149)	(0.0149)	(0.0147)	(0.0150)
$g^{GDP}_{c,t}$					1.253***	1.269***	1.227***	1.229***
					(0.0878)	(0.0873)	(0.0879)	(0.0897)
$inflation_{c,t-1}$					-0.0374***	-0.0321***	-0.0331***	-0.0350***
					(0.0120)	(0.0120)	(0.0118)	(0.0122)
$g^{GDP}_{c,t-1}$					-0.208***	-0.216***	-0.218***	-0.225***
					(0.0602)	(0.0606)	(0.0604)	(0.0619)
$BankCrisis_{c,t}$			-0.160					1.399*
			(0.664)					(0.777)
$CurrencyCrisis_{c,t}$	-4.655***		-4.756***		0.604			0.145
	(0.866)		(0.899)		(0.726)			(0.713)
$DebtCrisis_{c,t}$		-0.247	-0.0891			0.122		-0.348
		(0.534)	(0.547)			(0.885)		(0.904)
$AnyCrisis_{c,t}$				-1.655***			0.282	
				(0.533)			(0.600)	
N	21,324	21,324	21,324	21,324	11,668	11,668	11,668	11,668
R^2 (overall)	0.110	0.102	0.105	0.111	0.198	0.198	0.201	0.201

Robust standard errors in (). Clusters by industry-country.

***,**,* denote 1%, 5%, 10% statistical significance.

The last 4 columns include $\Delta MPR_{c,t}$, $\Delta MPR_{c,t-1}$ and $\Delta MPR_{c,t-2}$, but the coefficients are omitted.

All regressions include fixed effects by industry-country and year (omitted).

Now Table 7 considers similar estimates of the effects of the different financial crises, but restricted to the sample of EMDEs which is closer in financial and economic development to the MENA region. The results are somewhat similar to the entire sample in Table 6, although with a stronger effect of currency and any kind of financial crises on the EMDEs. Taking again a fully external dependent industry (i.e., $EFD = 1$) as a benchmark, in the MENA countries there is a reduction in growth of 5.2%, 0.3% and 2.9% for currency, sovereign debt and any type of financial crises, respectively. These effects are weaker than for the non-MENA EMDEs, which experience a reduction of industrial growth of 6.3%, 3.1% and 4.7% for currency, sovereign debt and any type of financial crises.

For both MENA and non-MENA EMDEs there is a stronger effect of banking crises, followed by the currency crises. Sovereign debt crises having a small and statistically insignificant effect for both MENA and non-MENA EMDEs. This confirms the results obtained in Table 6 with the entire country sample. Note that in the EMDE sample there is only a direct effect on all industries caused by the currency crises, which reduce growth by 4.8%. The direct effect of banking and sovereign debt crises in EMDEs is small and statistically insignificant.

With monetary policy controls, again the estimates show a stronger effect of currency and any financial crises on the MENA industrial growth. This could be due to many MENA countries having overvalued exchange rate pegs, which are dropped during a currency crisis in favor of a more flexible monetary policy. Finally, the results confirm clearly that industrial growth is positively associated with GDP growth and with higher procyclicality than the national economy. Industrial growth is also found to be lower for more developed economies and larger industries.

Table 8: Effects of any type of financial crisis on industrial growth, with interactions
for the Great Financial Crisis (2007-2009)

Controls	With macro controls		With monetary policy		W/ country-year fixed effects	
	All countries	EMDEs	All countries	EMDEs	All countries	EMDEs
$1(MENA_c = 0)$ interaction:						
$EFD_i \times AnyCrisis_{c,t}$	-2.604**	-4.477***	-1.884	-7.139***	-2.866***	-3.788***
	(1.011)	(1.338)	(1.181)	(1.615)	(0.931)	(1.161)
$EFD_i \times AnyCrisis_{c,t}$ $\times GFC_t$	-1.426	-2.793	-1.817	-1.241	1.429	3.459
	(1.324)	(3.156)	(1.268)	(2.650)	(1.612)	(3.865)
$1(MENA_c = 1)$ interaction:						
$EFD_i \times AnyCrisis_{c,t}$	-2.796	-2.824	-8.189**	-8.943***	-3.765	-3.732
	(2.150)	(2.283)	(3.300)	(3.432)	(3.430)	(3.491)
$EFD_i \times AnyCrisis_{c,t}$ $\times GFC_t$	2.180	-0.379	1.462	1.969	-21.42*	-21.43*
	(8.102)	(7.984)	(9.495)	(9.590)	(11.30)	(11.34)
Controls with no interactions:						
$ShareManVA_{i,c,t-1}$	-0.168***	-0.198***	-0.286***	-0.315***	-0.154***	-0.177***
	(0.0360)	(0.0497)	(0.0546)	(0.0927)	(0.0331)	(0.0443)
$\ln(GDP_{c,t-1}^{PPP,pc})$	-7.044***	-6.285***	-5.408***	-4.717***		
	(0.604)	(1.062)	(0.932)	(1.428)		
$inflation_{c,t}$			0.0357**	0.0417***		
			(0.0145)	(0.0146)		
$g_{c,t}^{GDP}$			1.158***	1.226***		
			(0.0602)	(0.0880)		
$inflation_{c,t-1}$			-0.0295**	-0.0331***		
			(0.0116)	(0.0118)		
$g_{c,t-1}^{GDP}$			-0.188***	-0.216***		
			(0.0455)	(0.0595)		
$AnyCrisis_{c,t}$	-2.388***	-1.636***	-0.463	0.286		
	(0.362)	(0.532)	(0.389)	(0.599)		
$\Delta MPR_{c,t}$			-0.00966**	-0.0109***		
			(0.00388)	(0.00392)		
$\Delta MPR_{c,t-1}$			-0.000354	-0.000219		
			(0.000276)	(0.000386)		
$\Delta MPR_{c,t-2}$			0.000395*	0.000605**		
			(0.000231)	(0.000243)		
N	41,648	21,324	26,906	11,668	41,980	21,412
R^2 (overall)	0.143	0.105	0.240	0.201	0.316	0.289

Robust standard errors in (). Clusters by industry-country.

***,**,* denote 1%, 5%, 10% statistical significance.

All regressions include fixed effects by industry-country and year (omitted).

The Great Financial Crisis (GFC) of 2008 was perhaps the greatest financial crisis that affected a large number of countries in the last 45 years. Table 8 show similar regressions as the standard

model in Table 4, but with an additional interaction for the period of the GFC (defined as a dummy variable for the years 2007 to 2009). The results do not show a statistically significant effect of the GFC on either MENA or non-MENA countries. This shows that the GFC was not significantly different from other financial crises after other growth factors were accounted for.

Table 9: Panel quantile regressions of the effect of any type of financial crisis
and of banking crisis on industrial growth (sample of all countries)

	Any financial crisis			Banking crisis		
$Crisis_{c,t} =$		$AnyCrisis_{c,t}$			$BankCrisis_{c,t}$	
Controls	Q25	Q50	Q75	Q25	Q50	Q75
$1(MENA_c = 0)\times$	-4.662**	-3.134**	-1.716	-4.281	-3.394	-2.571
$EFD_i \times Crisis_{c,t}$	(1.854)	(1.224)	(1.268)	(3.794)	(4.591)	(7.134)
$1(MENA_c = 1)\times$	-3.576	-2.136	-0.800	-10.28	-5.392	-0.855
$EFD_i \times Crisis_{c,t}$	(5.056)	(3.337)	(3.458)	(19.27)	(23.32)	(36.24)
$ShareManVA_{i,c,t-1}$	-0.0754	-0.178***	-0.274***	-0.0669	-0.174	-0.274
	(0.0723)	(0.0477)	(0.0494)	(0.118)	(0.143)	(0.222)
$\ln(GDP_{c,t-1}^{PPP,pc})$	-4.608***	-7.246***	-9.694***	-3.859**	-6.653***	-9.249***
	(1.019)	(0.673)	(0.697)	(1.656)	(2.003)	(3.113)
$Crisis_{c,t}$	-4.087***	-3.011***	-2.012***	-4.934***	-3.192*	-1.574
	(0.694)	(0.458)	(0.475)	(1.457)	(1.764)	(2.741)
$GreatModeration_{c,t}$	-1.318***	-1.170***	-1.033***	-1.590**	-1.344	-1.115
	(0.464)	(0.306)	(0.317)	(0.759)	(0.918)	(1.427)
GFC_t	-6.916***	-4.341***	-1.950***	-6.884***	-4.364***	-2.023
	(0.657)	(0.434)	(0.450)	(1.071)	(1.296)	(2.013)
N	41,648	41,648	41,648	41,648	41,648	41,648

Robust standard errors in (). Clusters by industry-country.
***,**,* denote 1%, 5%, 10% statistical significance.
All regressions include fixed effects by industry-country (omitted).

Finally, I test whether the results are robust to using quantile regressions. For non-MENA countries, Table 9 shows a statistically significant reduction in growth for both banking and any financial crises, with this effect being stronger in periods of low growth (quantile 25) and weaker during periods of high growth (quantile 75). This result makes sense, because periods of lower growth are associated with stricter financial needs and a more difficult access to finance. Financial crises for the non-MENA countries reduces industrial growth for fully dependent industries by 4.7%, 3.1% and 1.7% for the quantiles 25, 50 and 75. For the MENA countries, financial crises also have a higher effect on the lower growth quantiles, but the coefficients are not statistically significant. Banking crises have even stronger effects on the non-MENA countries, reducing growth of fully

dependent industries by 10.3%, 5.4% and 0.9% for the quantiles 25, 50 and 75, but the standard errors are large and the coefficients are statistically insignificant. Overall, this exercise confirms the negative effect on industrial growth of financial crises, especially for the non-MENA countries.

The direct effect on all industries caused by financial crises is statistically significant across all quantiles, being stronger for the lowest growth periods (quantile 25). Financial crises reduce the growth of all industries by 4.1%, 3% and 2% at the quantiles 25, 50 and 75. The same happens for banking crises. Banking crises reduce the growth of all industries by 4.9%, 3.2% and 1.6% for the quantiles 25, 50 and 75, with the highest quantile effect being statistically insignificant.

Finally, Table 10 shows the results with the external finance dependence channel of financial crises, after accounting for a triple set of paired fixed effects: industry-country, country-year and industry-year fixed effects. The results show that a fully externally dependent industry in a MENA country would experience a reduction in growth of 3.7% and 8.4% in banking and currency crises, respectively. If one considers just the EMDEs, then fully externally dependent industries experience a reduction in growth of 1.2% and 11.1% in banking and currency crises. The coefficients for the MENA countries, however, are not statistically significant, which may be due to the sample of MENA countries. However, the effects of banking and currency crises are statistically significant for the non-MENA countries, which experience a reduction in growth for fully dependent industries of 2.7% and 2.9% during banking and currency crises. For the sample of EMDEs, there is a reduction in growth for fully dependent industries of 7.1% during banking crises in the model with all types of crises. However, for the models with each crisis type separately, the results show that EMDEs suffer from all types of financial crises, experience a reduction in growth for fully dependent industries of 7.5%, 4.5% and 2.5% during banking, currency crises and sovereign debt crises. Furthermore, the effects found for the financial crises in the models with separate regressions are larger than the estimates for the all crises in the same regression, whether for all countries or EMDEs.

Table 10: Effects of banking crises on industrial growth across all countries and EMDEs,
with industry-country, country-year and industry-year fixed effects

	All types of crises in the same regression		Each type of crisis in separate regressions	
Controls	All countries	EMDEs	All countries	EMDEs
	$1(MENA_c = 0)$ interaction:			
$EFD_i \times Banking$	-2.674***	-7.047***	-3.091***	-7.509***
$Crisis_{c,t}$	(1.029)	(1.665)	(1.011)	(1.627)
$EFD_i \times Currency$	-2.870*	-2.741	-3.865**	-4.491**
$Crisis_{c,t}$	(1.620)	(1.893)	(1.584)	(1.824)
$EFD_i \times Sovereign$	-1.080	-1.385	-1.951	-2.507*
$DebtCrisis_{c,t}$	(1.245)	(1.384)	(1.242)	(1.411)
	$1(MENA_c = 1)$ interaction:			
$EFD_i \times Banking$	-3.715	-1.166	-5.626	-3.753
$Crisis_{c,t}$	(4.737)	(4.754)	(4.701)	(4.812)
$EFD_i \times Currency$	-8.420	-11.07	-8.764	-10.73
$Crisis_{c,t}$	(6.615)	(7.106)	(6.416)	(6.869)
$EFD_i \times Sovereign$	-0.620	-0.574	-1.716	-1.408
$DebtCrisis_{c,t}$	(2.480)	(2.846)	(2.314)	(2.638)
	Controls with no interactions:			
$ShareManVA_{i,c,t-1}$	-0.158***	-0.176***		
	(0.0341)	(0.0445)		
N	41,910	21,384	41,910	21,384
R^2 (overall)	0.343	0.328		

Robust standard errors in (). Clusters by industry-country and industry-year.
***,**,* denote 1%, 5%, 10% statistical significance. All regressions include $ShareManVA_{i,c,t-1}$
as a control, but its coefficient is omitted in the regressions with each type of crisis separately.
All regressions include fixed effects by industry-country, country-year and industry-year (omitted).

6   Total impact of the financial crises on manufacturing growth

The previous sections show the effects on growth of a particular industry. Coefficients must be interpreted as giving an effect on industries with no external finance dependence ($EFD = 0$) or an additional growth effect on industries with a specific external finance dependence value. However, industries have fairly different levels of EFD, as shown in Table 1. Furthermore, countries have different industrial specializations and their industries change over time. Therefore, the EFD of the total manufacturing sector differs both across countries and time.

For this reason, Table 11 summarizes the effect on total manufacturing implicit in the previous exercises. In the case of the additional growth effect experienced by industries with external finance

dependence, the total effect on the manufacturing sector of a country c at time t can be obtained as: $\theta_{c,t} = \gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$, with the weight $\varpi_{i,c,t} = \frac{VA_{i,c,t}}{\sum_i VA_{i,c,t}}$ being the share of each individual industry in terms of the value added of the entire national manufacturing sector. In the case of the regressions that include country-year fixed effects, this is the only term being estimated. For the regressions with macroeconomic controls, there is also the effect of financial crises on all industries (even those with $EFD = 0$). Therefore, in this case the total effect on the manufacturing sector is given by: $\mu_{c,t} = \delta_{Crisis} + \gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$. Table 11 reports both kinds of effects. Furthermore, since the effects differ across countries, Table 11 shows the average effects on the different country samples, that is: $\frac{1}{n_S} \sum_{c \in S} \theta_{c,t}$ and $\frac{1}{n_S} \sum_{c \in S} \mu_{c,t}$, with S denoting either the sample of all countries, EMDEs or MENA, and n_S the number of countries in each sample. Finally, I also show the estimated results for the effect of financial crises on each of the MENA countries, obtained from the regressions for the sample for all countries. Note that these are estimated counterfactual effects for hypothetical financial crises that would happen now and not the effect of previous financial crises that happened across MENA countries. In the case of Lebanon, the last data point was for 2018. That means the results for Lebanon may look rosier, since the measurement year is before its liquidity and sociopolitical problems started in 2019.

Table 11 summarizes the total industry impact obtained from the triple fixed effect regressions (Table 10), the double fixed effect regressions (Table 4) and the fixed effects model with macroeconomic controls (Table 4, 6 and 7). For simplicity, I show only the effects for the last year of the sample, which corresponds to the last pre-pandemic year, 2019. The results for the triple and the double fixed effect models are almost the same, both qualitatively and in size. The results are also similar, whether qualitative or in size, for the simultaneous regression with all crises and the separate regressions. Therefore, I will comment only on the results from the simultaneous regressions. Relative to the previous literature, studies such as Dell'Ariccia et al. 2008 only measured the external finance dependence channel for the triple fixed effect model for the average country and EMDE, that is the info on the first 3 columns and first 2 rows. However, my results show that the impact of financial crises is significantly larger once the direct effect on all industries is accounted for, as shown in the last 3 columns of Table 11.

Table 11: Effect on total manufacturing growth (in %) of different types of
financial crises (average across countries in 2019): estimates from all the models

All crises in the same regression model								
Coefficient average across countries	Tripe FE (i,c+i,t+c,t) $\gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$			Double FE (i,c+c,t) $\gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$			FE (i,c+t) plus controls $\delta_{Crisis} + \gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$		
Crisis type	Bank	Currency	Debt	Bank	Currency	Debt	Bank	Currency	Debt
All countries	-0.8	-0.9	-0.3	-0.9	-0.8	-0.3	-2.7	-5.9	-1.1
EMDEs	-2.1	-0.8	-0.4	-1.9	-0.8	0.0	-2.0	-6.0	-0.3
MENA	-1.0	-1.0	-0.4	-1.1	-0.9	-0.4	-2.8	-6.0	-1.2
Armenia	-0.2	-0.2	-0.1	-0.2	-0.2	-0.1	-2.0	-5.1	-0.6
Algeria	-0.7	-0.8	-0.3	-0.8	-0.7	-0.3	-2.6	-5.8	-1.0
Egypt	-0.8	-0.8	-0.3	-0.9	-0.8	-0.3	-2.6	-5.8	-1.0
Iraq	-1.9	-2.0	-0.8	-2.1	-1.9	-0.8	-3.8	-7.2	-1.9
Israel	-1.3	-1.4	-0.5	-1.4	-1.3	-0.5	-3.2	-6.5	-1.4
Jordan	-0.5	-0.6	-0.2	-0.6	-0.5	-0.2	-2.4	-5.5	-0.8
Kuwait	-0.8	-0.8	-0.3	-0.9	-0.8	-0.3	-2.6	-5.8	-1.0
Lebanon	-0.7	-0.7	-0.3	-0.8	-0.7	-0.3	-2.5	-5.7	-1.0
Morocco	-2.0	-2.1	-0.8	-2.2	-2.0	-0.8	-3.9	-7.3	-2.0
Oman	-0.9	-1.0	-0.4	-1.0	-0.9	-0.4	-2.8	-6.0	-1.1
Tunisia	-0.6	-0.7	-0.3	-0.7	-0.6	-0.3	-2.5	-5.6	-0.9
Türkiye	-0.9	-0.9	-0.4	-1.0	-0.9	-0.4	-2.7	-5.9	-1.1

Separate models for each crisis type								
Coefficient average across countries	Tripe FE (i,c i,t c,t) $\gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$			Double FE (i,c+c,t) $\gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$			FE (i,c+t) plus controls $\delta_{Crisis} + \gamma MENA_c \sum_i \varpi_{i,c,t} EFD_i$		
Crisis type	Bank	Currency	Debt	Bank	Currency	Debt	Bank	Currency	Debt
All countries	-1.0	-1.2	-0.6	-1.1	-1.2	-0.6	-3.4	-6.8	-2.2
EMDEs	-2.2	-1.3	-0.7	-2.1	-1.3	-0.5	-3.0	-6.5	-1.2
MENA	-1.1	-1.4	-0.7	-1.2	-1.4	-0.7	-3.6	-7.0	-2.4
Armenia	-0.2	-0.3	-0.1	-0.3	-0.3	-0.2	-2.6	-5.6	-1.5
Algeria	-0.9	-1.1	-0.5	-0.9	-1.1	-0.6	-3.3	-6.6	-2.1
Egypt	-0.9	-1.1	-0.6	-1.0	-1.1	-0.6	-3.4	-6.7	-2.2
Iraq	-2.2	-2.7	-1.4	-2.4	-2.7	-1.4	-4.7	-8.7	-3.6
Israel	-1.5	-1.9	-0.9	-1.6	-1.9	-1.0	-4.0	-7.6	-2.8
Jordan	-0.6	-0.8	-0.4	-0.7	-0.8	-0.4	-3.1	-6.2	-1.9
Kuwait	-0.9	-1.1	-0.6	-1.0	-1.1	-0.6	-3.3	-6.7	-2.2
Lebanon	-0.8	-1.0	-0.5	-0.9	-1.0	-0.5	-3.2	-6.5	-2.1
Morocco	-2.3	-2.8	-1.4	-2.5	-2.8	-1.5	-4.8	-8.9	-3.7
Oman	-1.1	-1.3	-0.7	-1.2	-1.3	-0.7	-3.5	-6.9	-2.3
Tunisia	-0.7	-0.9	-0.5	-0.8	-0.9	-0.5	-3.2	-6.4	-2.0
Türkiye	-1.0	-1.3	-0.6	-1.1	-1.3	-0.7	-3.5	-6.9	-2.3

For the all countries sample, the external finance dependence channel, as estimated by the triple

fixed effects model with all crises, implies a reduction in total manufacturing of 0.8%, 0.9% and 0.3%

during banking, currency and sovereign debt crises, respectively. For EMDEs, the external finance dependence channel implies a reduction in total manufacturing of 2.1%, 0.8% and 0.4% during banking, currency and sovereign debt crises. This shows that banking crises have a much stronger external dependence effect on EMDEs. Across MENA countries, the external finance dependence channel is worse on Morocco, Iraq and Israel for all types of financial crises. In particular, for Morocco, Iraq and Israel there is a manufacturing growth reduction of 2%, 1.9% and 1.3% during banking crises, 2.1%, 2% and 1.4% during currency crises, and 0.8%, 0.8% and 0.5% during sovereign debt crises.

In terms of the total impact of financial crises, which sums the direct effect on all industries and the external finance dependence channel, the results show that currency crises are the worst type of financial crisis across all countries. Note also that the total impact of financial crises is more than twice as large as the external finance dependence channel, showing that the direct effect on all industries represents the strongest effect. In the sample of all countries, there is a manufacturing growth reduction of 2.7%, 5.9% and 1.1% during banking, currency and sovereign debt crises, respectively. Banking and sovereign debt crises are somewhat more attenuated for the EMDEs, but not for the MENA countries. For EMDEs, there is a manufacturing growth reduction of 2%, 6% and 0.3% during banking, currency and sovereign debt crises. For MENA, there is a manufacturing growth reduction of 2.8%, 6% and 1.2% during banking, currency and sovereign debt crises. The countries experiencing the worst total impact from financial crises of all types are again Morocco, Iraq and Israel. For Morocco, Iraq and Israel there is a manufacturing growth reduction of 3.9%, 3.8% and 3.2% during banking crises, 7.3%, 7.2% and 6.5% during currency crises, and 2%, 1.9% and 1.4% during sovereign debt crises.

7 Conclusions

This work studies the effect of banking crises on the real industrial growth among the MENA countries. I find that banking crises have a negative growth effect on industries with a higher external finance dependence, but with an especially strong impact among EMDEs.

In the case of fully externally dependent industries, banking crises reduce industrial growth by 3.3% for non-MENA and 5.9% for MENA countries. Considering just EMDEs, banking crises

reduce growth by 7.5% for non-MENA and 8.3% for MENA countries in fully dependent industries. Furthermore, the results show that industrial growth is declining according to the industries' size and the countries' development level, while being more procyclical than the national economy. Extending the analysis to all types of financial crises, the results show that banking and currency crises have a stronger impact on growth than sovereign debt crises. For fully externally dependent industries, banking, currency and sovereign debt crises reduce industrial growth by 2.9%, 3.5% and 2.1% for non-MENA and 3.3%, 5.6% and 0.5% for MENA countries. These results, however, affect manufacturing growth, depending on the degree of external finance dependence of the industries of each country. After accounting for the industrial composition of each country, I find that the direct impact of financial crises on the growth of all industries is the most important effect. The total impact of financial crises of all types is worse for the MENA countries, especially for Morocco, Iraq and Israel.

The models with controls for monetary policy show that it substantially attenuates the effect of banking and currency crises among MENA countries, which would have experienced much worse drops in output without monetary policy. Monetary policy seems to compensate part of the output fall of the banking and currency crises in MENA countries, perhaps because those countries may drop harmful exchange rate pegs in order to pursue a more flexible monetary policy. Sovereign debt crises do not have a statistically significant effect on manufacturing growth after accounting for monetary policy or country-year fixed effects, perhaps because there are fewer of such events.

Finally, quantile regressions show that financial crises of any type and banking crises have a stronger effect during periods of low growth, whether for MENA or non-MENA countries. This result could be due to difficulties to access finance being stronger during slower growth periods.

There are still many research points to answer in terms of the effects of banking crises on the MENA region. One possible aspect is to study the effects of banking crises on other industries, such as commodities and services, since manufacturing tends to represent a small share of the total economy. Another aspect is that most countries updated their regulatory frameworks after the Great Financial Crisis of 2008 (Madeira 2024a) and the MENA region is no exception. Therefore, it is relevant to know whether the recent regulatory mechanisms make the MENA more robust to the different types of financial crises and with better tools to cope with such events.

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