Does Economic Diversification Foster Resilience to Crises? Empirical Investigation

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Abstract

This paper aims at assessing the resilience enhancing characteristic of economic diversification. The analyses performed in this study consist in comparing the output losses and recovery pace of countries of different income and exports diversification levels after the occurrence of banking and currency crises. To that end, local projection (LP) models are employed to estimate impulse response functions (IRFs) in order to trace the effects of the crises on output levels over a 10-year horizon. Potential endogeneity is accounted for using instrumental variable local projection (IV-LP) alternative models. The results tend to advocate in favor of more diversification as such strategy appears to foster the ability of countries to absorb and/or recover from shocks regardless the income level. These findings contradict in some extent the hypothesis of a U-shaped relationship between income and diversity which predicts incentives for re-concentration in advanced economies. These conflicting outcomes may be the sign of a more pronounced trade-off between growth and stability goals in advanced economies compared to countries at early stages of development.

Keywords: Resilience, Recovery, Crises, Economic Diversity, Local Projections

1. Introduction

"Common wisdom" suggests that a greater level of economic diversity guarantees higher economic stability and steady growth to countries. It is assumed that spanning the sources of income and employment over a wide range of activity sectors, especially if these sectors are not correlated, contributes to reducing the risks and magnitude of economic downturns (Attaran, 1986). Although the common wisdom on the impact of economic diversity on stability and growth seems intuitive, the literature has not always supported that idea. The main argument against that intuition is that as countries diversify, they lose on the growth enhancing properties of comparative advantage-based specialization (Malizia & Ke, 1993).

Many studies on economic diversity intend to analyze whether growth and unemployment are favorably influenced by a higher level of diversity. More recently, that question has been increasingly analyzed through the angle of economic resilience. Several studies aiming at evaluating the impact of economic diversity on the ability of countries to absorb and recover from some identified shocks have emulated (See for example Xiao & Drucker (2013) and Brown & Greenbaum (2017)). The literature on economic recovery shows that, after being struck by a crisis, the convalescence of countries differs based on the type of crisis and on the level of development of the country (Cerra & Saxena, 2008, 2017).

This paper aims at assessing whether greater levels of economic diversity are associated with better economic resilience by looking at two types of crises (i.e. currency and banking crises) and different income groups. To that end, we check if countries with higher levels of export diversification experience lower disturbances and/or recover from these shocks at a faster pace than countries with greater sectoral concentration. Table 1 displays the average durations and depths of recession episodes observed in a sample of 196 countries over the period 1960-2019. The duration corresponds to the number of consecutive periods with negative growth while the depth refers to the cumulated percentage of output loss over the recession period. On average,

middle-income countries appear to experience deeper losses than the other income groups. The depth of recession episodes tends to be the lowest, and below the overall average, in high-income countries. However, advanced economies seem to experience longer recessions than most income groups (only topped by lower middle-income countries) while low-income countries appear to return to positive figures at the fastest pace. This tends to show some heterogeneity in the path to recovery amongst the different income groups.

	Mean full (SD)	*Mean non-diversified (SD)*	*Diversified diff. (p-value t-test)*	*Kolmogorov-Smirnov test (p-value)*
Panel A. Depth				
All countries	-6.28	-6.80	-2.42	0.12
	(9.43)	(10.00)	(0.004)	(0.05)
Low income	-6.71	-6.91	-1.22	0.19
	(10.26)	(10.28)	(0.29)	(0.37)
Lower middle income	-7.09	-6.33	4.02	0.23
	(11.07)	(7.85)	(0.04)	(0.15)
Upper middle income	-6.81	-7.30	-2.24	0.12
	(10.13)	(10.98)	(0.09)	(0.65)
High income	-5.08	-5.60	-3.70	0.30
	(6.83)	(7.20)	(0.002)	(0.01)
Panel B. Duration				
All countries	1.55	1.55	-0.01	0.04
	(1.12)	(1.12)	(0.48)	(0.99)
Low income	1.41	1.42	0.06	0.10
	(0.99)	(0.97)	(0.39)	(0.94)
Lower middle income	1.70	1.67	-0.19	0.07
	(1.39)	(1.21)	(0.26)	(0.99)
Upper middle income	1.52	1.53	0.05	0.04
	(1.02)	(1.04)	(0.38)	(1.00)
High income	1.66	1.70	0.34	0.14
	(1.21)	(1.28)	(0.06)	(0.55)

Table 1. Recessions depth and duration summary statistics.

The second column of table 1 shows the mean depths and durations of recessions in non-diversified economies. This sub-group encompasses countries exhibiting the lowest levels of export diversification. The IMF's export diversification index is used to assess the level of diversification of countries in this analysis. Countries that belong to the 25-percent most diversified economies of the considered group (i.e. entire sample or income group) based on that index, are qualified as diversified while the remaining countries are non-diversified. It appears that non-diversified countries experience steeper depth than the average for all groups in the exception of lower middle-income countries. Regarding the duration of recession episodes, non-diversified countries also tend to exhibit worse figures than the average. In that case again, lower middle-income countries show contradictory features as non-diversified countries in that income group tend to return faster to upward output trends than the group average.

The third column of table 1 displays the difference in averages of depth and duration between diversified and non-diversified countries, along with the corresponding p-values of Student-t tests. The average depth appears to be significantly smaller in diversified countries than in non-diversified countries for the entire sample, as well as for upper-middle countries and advanced economies. No significant difference in recession depth is detected for low-income countries,

while lower middle-income countries seem to be an exception again with significantly deeper recessions in diversified countries. No significant differences are observed between diversified and non-diversified countries except for high-income countries. In this latter income group, diversified countries appear to experience longer recessions than non-diversified countries. The last column of table 1 shows the results of Kolmogorov-Smirnov test for difference in distributions between diversified and non-diversified countries. It shows significant differences in the distribution of depths in the entire sample and for high-income countries. Despite the exceptions observed for lower middle-income countries and in some case for high-income countries, these preliminary observations tend to support the idea of more severe (either deeper and/or longer) recessions in non-diversified countries compared to more diversified economies.

Figure 1 shows a positive relationship between the level of economic concentration expressed by the export diversification index[1], and the average lending interest rates. This tends to show that a higher economic concentration is associated with higher risk premia and shrinkages in bank loans. It is expected that a higher degree of economic diversification would decrease lending rates and increase the resilience to financial shocks. This is because the level of sectoral diversification in the economy is likely to be reflected in the diversity of bank clients and assets. Indeed, bank customers would be employees and companies from a wider variety of activity sectors. Moreover, investments would also be spanned over a larger range of sectors. Alkhouri & Arouri (2019) argue that asset-based diversification has a positive effect on bank performances as measured by return on asset and return on equity. This tends to foster the capacity of banks to absorb adverse shocks and leads to increased and more stable loans, including to riskier firms. In turn, these desirable effects result in positive spillovers for the economy (Gelman et al., 2021). Such effects may therefore help countries to resist better to banking crises and recover faster from it.

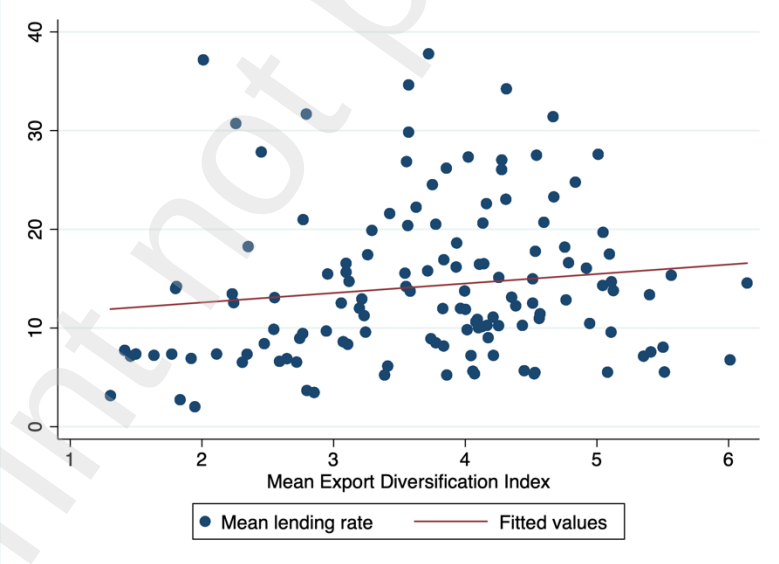

Figure. 1. Mean interest rate on lending and mean exports concentration.

Economic diversification is assumed to increase resilience to currency crises through at least two channels. Firstly, figure 2 shows that greater levels of concentration of exports tend to be associated with lower levels of foreign exchange reserves. Exports diversification is expected to insure greater levels of reserves through the multiplication of activity sectors and/or trading partners.

[1] A higher value of the index corresponds to a lower level of export diversification.

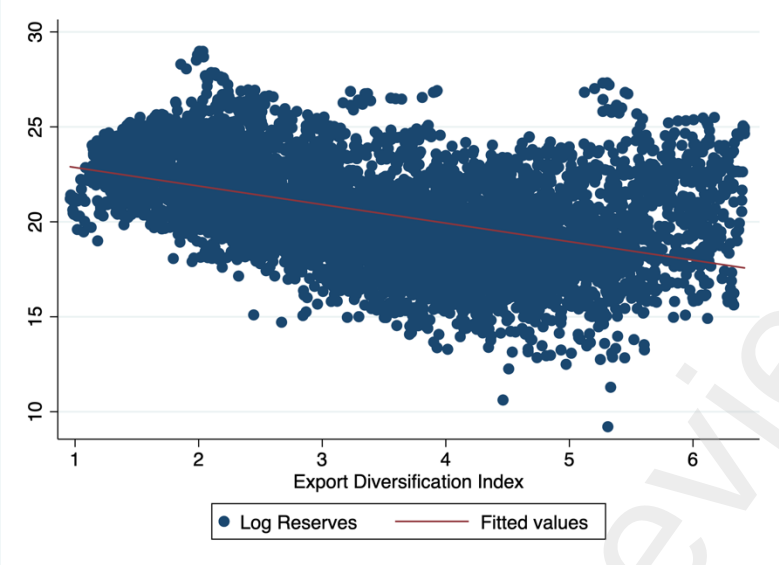

Figure. 2. Log of foreign exchange reserves and exports concentration.

Secondly, Alley (2018) argues that countries that reach higher levels of economic diversification tend to improve the value of their national currency. This is because as countries activate more activity sectors, they increase export revenues and reduce the import bills given that more tradeable goods (i.e. goods that can be exported or imported, and thus subject to international competition) become available locally. Moreover, export diversification is expected to reduce exchange rate volatility which is a factor of currency crises. Figure 3 shows a positive relationship between the mean sectoral concentration and the standard deviation of nominal exchange rate[2]. Instability in the exchange rate tends to increase uncertainty over the production of traded goods. Guzman et al. (2018) argue that under the assumption of risk-averse firms, unstable exchange rates discourage investment in traded sectors. Higher levels of diversification can, thus, have positive spillovers on the economy by enhancing exchange rate stabilization.

We use panel local projections to generate impulse response functions and evaluate how economic growth responds to various types of shocks. We then compare how highly diversified countries absorb these disturbances in contrast with the sample average.

Beyond this introductory section, the remainder of this paper is as follows: section 2 presents background studies on economic diversification and recovery. The sample on which the investigations are performed, along with the analysis methodology are discussed in section 3. The last two sections present respectively the results of the analyses and the conclusion drawn from these findings.

[2] Official exchange rate (Local currency per US$, period average) for countries with floating exchange rate regimes. Countries using the US$ as local currency are excluded, as well as outliers (i.e. observations further than two standard deviations away from the sample mean of exchange rate standard deviation).

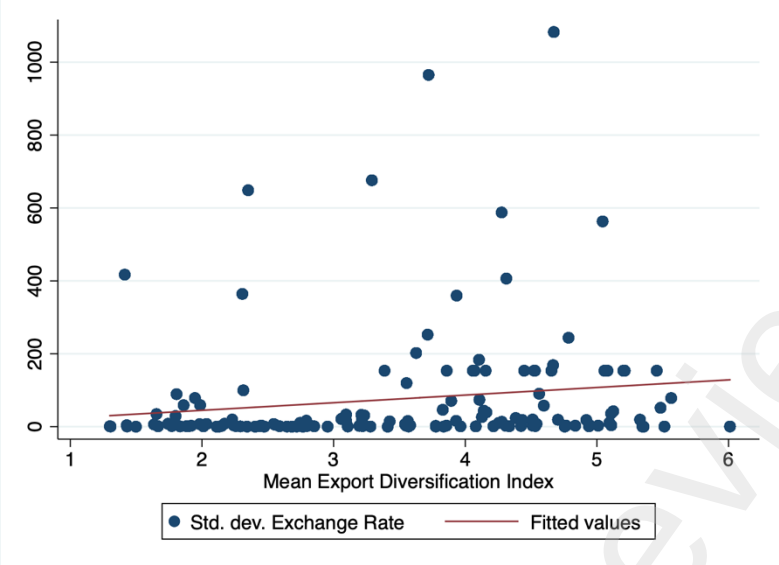

Figure. 3. Standard deviation of official exchange rate and mean exports concentration.

2. Relevant literature

2.1. Economic diversification

The literature provides us several definitions of economic diversification and various angles through which to consider that topic. Kenen (1969) defines economic diversification as the number of single-product regions contained in a country. The idea is that as each region focuses on its comparative advantage, diversification for a country consists in the sum of multiple regional specializations. For Hackbart & Anderson (1975) and Attaran (1986), economic diversification refers to an equalization of the shares of activity sectors in total employment. Through that prism, a country is fully diversified when equal importance of sectors is reached. Imbs & Wacziarg (2003) follow the idea of equal sectoral contribution and argue that a country is diversified when its economic activity is spread more equally across sectors. Malizia & Ke (1993) include the notion of uncorrelation amongst sectors in their conception of diversity. They claim that diversity refers to the variety of economic activity which reflects differences in economic structure. For Chen (2016), diversification refers to a transformation of the economy through a widening of sources of income spread over primary, secondary, and tertiary sectors, involving a large section of the population.

There are various definitions of economic diversification and the metrics to measure it are also numerous. There seems however to be a consensus in the literature on the fact that economic diversification should be linked to levels of employment, exports, or income. Thus, the level of diversity can be measured as the share of sectors in GDP, in exports or in total employment, or as the dependence of a country on the export of a good or commodity (Chen, 2016). Alsharif et al. (2017) argue that for large countries with important internal markets, employment trends are likely to be better indicators of diversification. On the other side, for small and medium sized countries with smaller internal markets and a higher propensity to be outward oriented, export-based measures are better indicators. In this paper, export diversification index is used to measure economic diversification. The rational for that choice is two-folded: (1) it is expected that, even though export-based indicators may not show us a complete picture of economic diversification, especially for large countries, these measures are accurate enough in most cases. Indeed, large countries with strong and self-sufficient internal markets are more the exception than the rule. Moreover, the potential bias due to the use of export-based indicators is likely to

go in the sense of an underestimation of the state of diversification. Therefore, these indicators can be considered as more restrictive measures of diversification. (2) Quality sectoral employment data are not available for several countries. This makes the computation of employment-based indicators challenging in many cases.

According to the "conventional wisdom", economic diversification fosters economic performances either by promoting higher levels of economic well-being or by improving the ability of regions to absorb the adverse effects of economic cycles. The idea behind this assumption is that, as diversified regions do not put all their eggs in the same basket, they become less sensitive to fluctuations caused by changes in economic factors (Attaran, 1986). Several studies have attempted to test this assumption by relating indices of diversification to economic performance indicators (e.g. Kort, 1981; Attaran, 1986; Malizia & Ke, 1993; Wagner & Deller, 1998; Dissart, 2003; Trendle, 2006; Joya, 2015; and Siswana & Phiri, 2020).

In an early attempt to analyzing the relationship between diversity and growth and stability, Attaran (1986) approaches industrial diversification in terms of balanced employment across industry classes. In that study, Shannon's entropy function is used to measure economic diversity. The entropy method measures diversity of regions against a uniform distribution of employment where the norm is equal employment in all industrial sectors. Moreover, economic performance is assessed in terms of two economic variables, namely unemployment and per capita income, considered in four different ways: (1) the level of the variable, (2) its rate of change over time, (3) the degree of instability of the variable, and (4) the degree of instability of the rate of change. The author finds no clear relationship between diversification and economic performances. Moreover, Attaran (1986) argues that the process of economic diversification is a more complex matter than simply finding new industries which are merely different from the existing ones.

(Malizia & Ke, 1993) argue that many early studies such as Attaran (1986) failed to clarify the influence of economic diversity on unemployment and instability for three main reasons: (1) the underlying theory explaining the influence of diversity on stability was not well developed; (2) these studies often used inappropriate operational measures and units of analysis, and weak empirical tests; and (3) models that include sound measures of diversity and instability may have biased parameters because they exclude important control. The authors performed a study on a sample of 255 U.S. metropolitan areas from 1972 to 1988. Some control variables of labor force characteristics, economic structure, and population size were included. They conclude that diversity gives a protection against high unemployment and instability. In addition, they find that more homogenous staffing patterns make reemployment easier. Thus, areas with more diverse industrial structures and less diverse occupational structures experience lower unemployment rates and less employment instability.

Another important point raised by Malizia & Ke (1993) is that while greater diversity and higher growth rates tend to lower unemployment, higher growth results in more unstable unemployment. Wagner & Deller (1998) underline the potential contradiction between growth and stability. Indeed, elementary economic theory suggests that growth should be derived from economic specialization based on comparative advantage. On the other side, theory also suggests that stability is achieved through diversity by spreading risk (or opportunities) over many activities. It seems therefore that policymakers must choose between two polar goals of growth and stability. However, (Wagner & Deller, 1998) argue that both goals can be pursued simultaneously when considered in terms of short- and long-run objectives. Short-run policies can be viewed as more growth oriented, with policy makers capitalizing on the comparative

advantage of the region by specializing in a few sectors. The aim of these strategies is to target growth industries. Diversification policies should be viewed as the long-run envelope of the region's short-run efforts. This can be seen as promoting stability with growth. As stability and diversification increase, so should the potential for growth.

Beyond the portfolio theory advocating for more sectoral diversity, Imbs & Wacziarg (2003) argue that economic diversification is also related to the structure of agents' preferences. Indeed, agents with non-homothetic preferences tend to change their consumption patterns as income grows. Markets respond to these changes in consumption and sectoral diversification naturally increases to satisfy the new needs. Economic diversity is thus closely related to the level of economic development. Imbs & Wacziarg (2003) analyze the evolution of sectoral concentration with respect to the level of per capita income. The authors find that through the path of economic development, countries reach different stages of diversification. The study shows that sectoral concentration follows a U-shaped pattern as countries become wealthier. It appears that at lower stages of development, countries first tend to diversify and then, after reaching a certain threshold relatively late in the development process, they tend to return towards more sectoral specialization. In a policy paper from the IMF (2014) using export diversification to evaluate economic diversity, this threshold was located at levels of GDP per capita of $25,000-$30,000. Mania & Rieber (2019) support the idea of a step back towards greater concentration as a dominant strategy for advanced countries in the context of global value chains (GVCs) integration. The authors show that most advanced Asian countries have increasingly specialized in the exports of more sophisticated products, this resulting in more sustainable long-run growth rates. On the other side, in line with the "catch-up" strategy of emerging markets predicted by Mudambi (2008), Asian countries with lower levels of development have diversified their exports following the abandonment of labor-intensive activities by the most advanced countries in the region. Siswana & Phiri (2020) add upon to the side of re-specialization as the authors find exports diversification to be negatively related to growth in the BRICS economies while exports concentration appears to be a positive and significant confounder of growth in these countries. This latter study tends to show that BRICS countries may have reached the inflexion point where diversification does not improve growth anymore, this making re-concentration a better strategy. These findings exclude the idea of a monotonic relationship between GDP and economic diversification. Note however that Bahar (2016) contrasts the re-specialization pattern in advanced economies observed by Imbs &Wacziarg (2003) and by the aforementioned more recent studied. The author argues that re-specialization in high-income countries is not the norm. Moreover, even when this pattern is observed, high-income countries tend to remain more diversified than developing countries, especially when considering higher disaggregation levels of exports data. Nevertheless, it appears that studies aiming at assessing the pitfalls of sectoral diversity, especially those analyzing several countries, should be cautious about the heterogeneity in stages of development within the observed samples.

2.2. Economic recovery

After experiencing an episode of recession, countries are considered to have recovered when all output losses are reversed. The literature on economic recovery is paved with papers questioning the fact that recovery can be a reality, some of which asking whether that concept should not be considered as a myth (e.g. Cerra & Saxena, 2008 and Teulings & Zubanov, 2014). Scholars supporting the idea that countries tend to reverse output losses from negative shocks are also legion. These opposing camps have noticeably raised their voices during and in the aftermath of the Global Financial Crisis (GFC). Cerra & Saxena (2017) report debates of some

important business cycle economists on growth predictions in 2009. On the side less keen to buying the idea of (rapid) recovery was Gregory Mankiw who claimed that unexpected downturns in real GDP are likely to remain highly persistent. This is in line with Cerra & Saxena (2008) and Cerra et al. (2013) who argue that countries subject to frequent or severe economic and political shocks often fail at reaching pre-shock growth trends, especially in the absence of sound macroeconomic policies to accompany the effects of the shock. On the other side, economists such as Brad Delong and Paul Krugman challenged the idea of Mankiw. They based their views on the idea that the underutilization of human resources (i.e. high unemployment) and capital that characterizes recessions is sufficient to except fast growth when those resources come back into use. These latter views are in line with the Friedman's (1993) plucking model which states that the size of recessions predicts growth rates during recovery periods in the sense that stronger contractions are followed by higher growth episodes to reach pre-recession levels. This can be pictured as a guitar string that comes back up faster after being plucked down harder (Clayes & Walsh, 2015 BRUEGEL). Cerra & Saxena (2017) show that weak economic activity and slow growth have persisted over almost a decade after the Global Financial Crisis, this tending to confirm that recovery must not be taken for granted. Note also that the type of crisis matters in the magnitude and persistency of output losses. Cerra & Saxena (2008) for example analyze a panel of 190 countries from 1960 to 2001 and consider various types of shocks (i.e. currency crises, banking crises, twin financial crises, wars, deterioration in political governance and twin political crises). The authors show that, depending on the type of shock, the persistency of output loss has on average a magnitude ranging from around 4 percent to 16 percent.

Brown & Greenbaum (2017) argue that the fact that countries do not always recover proportionally to downturns after recessions may reflect the contrasts between resilient and non-resilient countries. The authors then open the question of identifying the factors that foster economic resilience. In the current paper, the trail of economic diversity as a factor of resilience after negative shocks is followed. Some previous studies (e.g. Brewer and Moomaw, 1985; Dissart, 2003 and Trendle, 2006) found that economic diversity acts to reduce economic instability. Brewer and Moomaw (1985) borrow from financial economics and argue that economic diversification measures built following Markowitz (1952) portfolio selection theory are highly significant confounders of economic stability. This is because diversity that reflects risks spreading over various sectors with few and weak inter-sectoral linkages can help absorbing adverse shocks. Watson & Deller (2017) find that economic diversity was associated with lower levels of unemployment in the U.S. over the period 2007-2014. Beyond purely economic considerations, Xiao & Drucker (2013) argue that economic diversity accelerates income recovery and boosts employment growth after natural disasters. As higher economic diversity is associated with greater economic stability, lower unemployment, and accelerated growth, it can be naturally considered as a factor of economic resilience to negative shocks. Deller & Watson (2016) note however that while economic diversity is associated with higher employment stability, it also coincides with lower wage stability. This may reflect some trade-off between employment stability and wage stability in periods of economic downturns.

3. Data and Methodology

3.1. Data

The dataset used for this analysis consists of unbalanced panel data over the period 1960 – 2019 for 196 countries. GDP growth rates data come from the World Bank's World Development Indicators (WDI) database. Countries are grouped into different income levels (i.e. low-income,

lower middle-income, upper middle-income and high-income) following the World Bank's classification. The IMF's export diversification index (EDI) is used to create a dummy variable to identify diversified countries. This indicator is a Theil index that considers diversification across products and trading partners. It reflects increases in the number of export products and trading partners (i.e. extensive margin) as well as the equalization of shares of export volumes across active products and partners (i.e. intensive margin). Lower values of the EDI are associated with higher diversification while higher values of the index correspond to a greater concentration of exports. The dummy variable for diversified economies takes 1 for countries located in the lower quartile of average EDI.

In line with Cerra & Saxena (2008), an exchange market pressure index (EMPI) is computed for each country to create a currency crises variable. The EMPI consists in the percentage depreciation in the exchange rate plus the percentage loss in foreign exchange reserves. The official exchange rate relative to the U.S. dollar is used to calculate exchange rate depreciation while total reserves minus gold data expressed in current U.S. dollars are used to assess the percentage loss in reserves. Data on both indicators are readily available in the World Bank's database. The dummy variable for currency crises takes the value 1 for country *i* at period *t* if the EMPI is in the upper quartile of all observations.

The banking crises dummy variable is built with data on crises provided by Laeven & Valencia (2018). The authors define banking crises as events characterized by significant signs of distress in the banking sector (e.g. important bank runs, losses in the banking system and bank liquidations) and significant banking intervention measures in response to these signs of distress. Laeven & Valencia (2018) provide information on banking crisis dates around the globe over the period 1970-2017.

3.2. Panel local projections

The methodology followed in this analysis consists in assessing the impact of the identified banking and currency shocks on GDP growth. Potential differences in the response of growth in diversified countries compared to sample averages are then spotted. To do so, local projections (LPs) introduced by Jordà (2005) are used to estimate impulse response functions (IRFs). LPs are preferred to the alternative vector autoregressions (VAR) methodology because they allow for IRF estimation with identified shocks. Indeed, as mentioned by Adämmer (2019), unlike with the traditional VAR approach in which shocks are identified within the model as residuals of autoregressions, in the LP approach shocks can be identified prior to the estimation. In the current analysis, dummy variables for shocks have been created following Cerra & Saxena (2008). Secondly, another desirable feature of LPs for this analysis is that they can be used for panel data as shown by Jordà et al. (2015). The general equation of local projections for panel data with identified shocks is as follows:

$$y_{i,t+h} = \alpha_{i,h} + Shock_{i,t}\beta_h + x_{i,t}\gamma_h + \epsilon_{i,t+h}, \quad (1)$$

where $y_{i,t}$ is the endogenous variable, $\alpha_{i,h}$ denotes country cross-section fixed effects, $Shocks_{i,t}$ is the identified shock dummy variable, $x_{i,t}$ is a vector of control variables and $h = 0, 1, \ldots, H-1$ denotes the forecast horizon. In this analysis, the endogenous variable is the logarithm of real GDP, and the 1-year lag of the same variable is used as control variable. The shock variable is either the banking or the currency crises dummy variable.

Following Jordà et al. (2015), instead of using absolute values of $y_{i,t}$, $\Delta_h y_{i,t-1} = (y_{i,t+h} - y_{i,t-1})$ is used as endogenous variable. The rational for opting for this transformation is that using the change in the log of GDP from the base year *t-1* up to year *t+h* generates cumulated impulse response functions. The advantage of cumulated IRFs for the current analysis is that they allow to see whether the effects of shocks remain persistent or if recovery is achieved over the 10-year forecast horizon considered. This transformation leads to the following specification of local projections:

$$\Delta_h y_{i,t-1} = \alpha_i^h + Shock_{i,t}\beta_h + x_{i,t}\gamma_h + u_{i,t+h}. \quad (2)$$

Note that log GDP is taken in h-difference when used as endogenous variable, while it enters as absolute value when its 1-year lag is used as control variable. It is assumed that lagged GDP reflects the levels of investments made previously and the quantity of labor force available at the beginning of the year, which are crucial confounders of growth. Keeping this control variable as absolute value is consistent with the hypothesis of conditional convergence. This hypotheses states that although national idiosyncrasies explain differences in growth rates amongst countries, *ceteris paribus*, advanced economies have lower growth rates than low-income countries (Papyrakis & Gerlagh, 2004).

4. Results

Figure 4 displays the cumulated impulse response functions from banking crises. The results show that banking crises have negative and rather persistent impacts on output in the entire sample as well as for all income groups taken separately, except for upper middle-income countries. The average depth of output loss is about 5.4 percent and less than half of it (about 2.1 percent) is recovered up to nine years after the occurrence of the crisis.

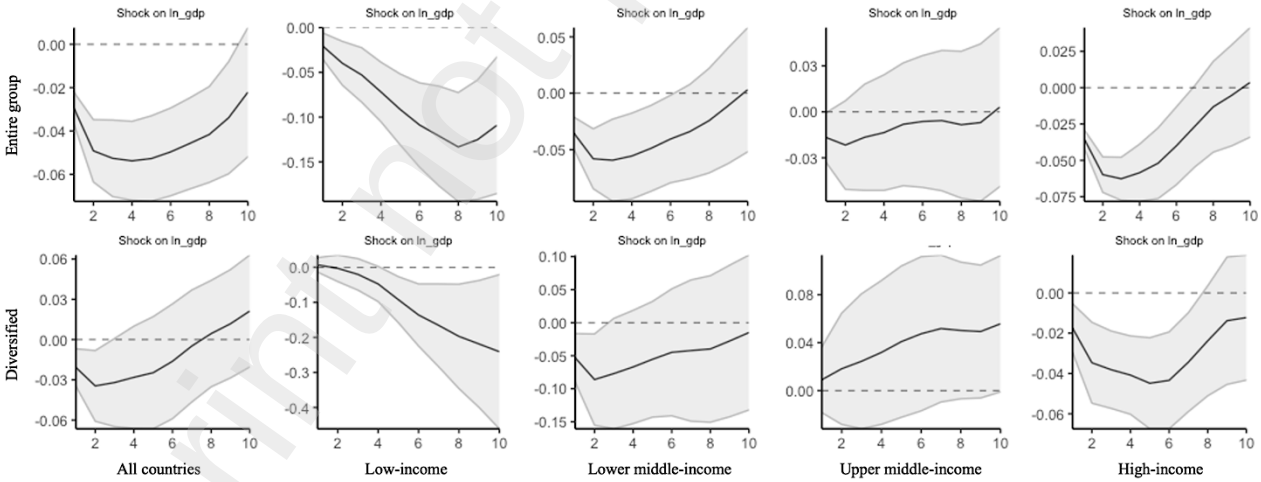

Figure 4. Cumulated IRFs of log GDP to banking crises estimated via LP.

Low-income countries experience the greatest output fall (13.3 percent) and still suffer a 10.9 percent cumulated loss after ten years. Lower middle- and high-income countries appear to show no remaining signs of losses respectively five and six years after the occurrence of a banking crisis. These results differ from the findings of Cerra & Saxena (2008) as the authors argue that output losses from banking crises are not fully recovered over a 10-year horizon. Moreover, the current results also contradict the outcomes of Laeven & Valencia (2018) stating

that high-income countries tend to experience more persistent and higher output losses than low- and middle-income countries.

In line with the expectations, overall, more diversified economies tend to register fewer output losses (about 3.5 percent) and faster recovery (no remaining significant signs of cumulated output loss observed three years after the crisis) than the average. However, the depth and persistency of output losses from banking crises for diversified countries tend to vary amongst income groups. Surprisingly, the impact of banking crises is almost twice as large (about 24 percent loss) in diversified low-income countries as in the entire income group. Nevertheless, these effects appear to be retarded in that sub-group as significant signs of output losses are observed only starting from fourth year after the crisis. Diversified lower middle-income countries also experience greater losses (7.7 percent) than the average of the income group average (slightly over 5 percent), yet they tend to fully recover at a faster pace than the average. The negative impact of banking crises on diversified high-income countries (4.5 percent loss) is lower than the average impact for that income group (6.3 percent loss), while the no discrepancy in the speed of recovery is observed.

Similar to Cerra & Saxena (2008), figure 5 shows highly persistent negative impacts of currency crises on output regardless the income group. On average, the output loss amounts to 5.4 percent overall, with no sign of recovery over the 10-year horizon. The deepest loss (6.6 percent) is observed in lower middle-income countries, while advanced economies appear to experience the lowest negative impact (3.7 percent loss, of which about a quarter is recovered after ten years). Apart from upper middle-income countries, diversified countries register lower output loss and/or faster pace of recovery than the average for all income groups.

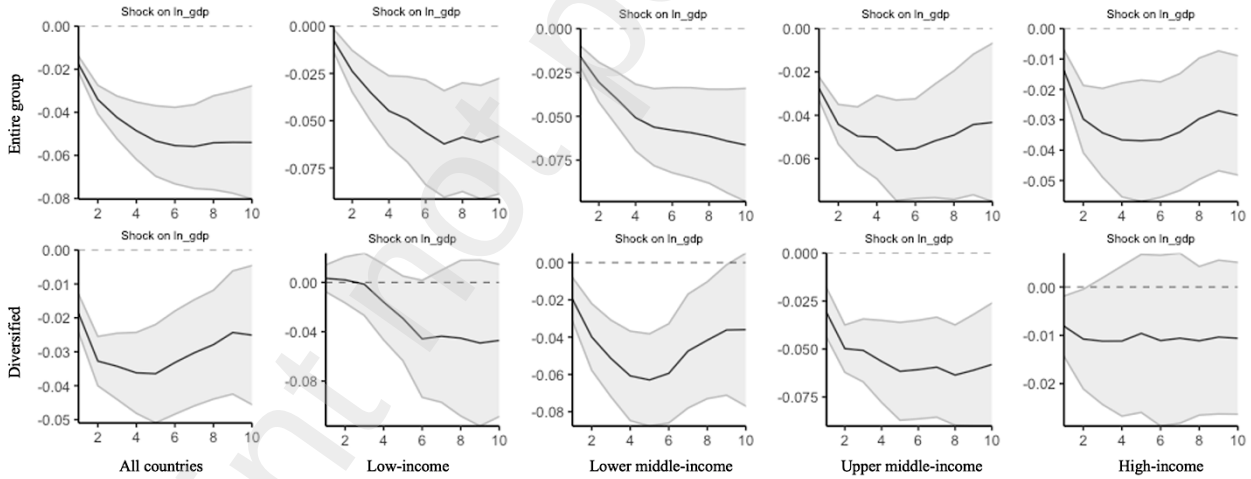

Figure 5. Cumulated IRFs of log GDP to currency crises estimated via LP.

Table 2 displays the percentage the average percentage of crises years with respect to the total number of available years for the full sample as well as for all income groups and diversified sub-groups. Except for banking crises in high-income countries, the probability crisis tends to increase as the income level decreases. This constatation is even more striking for currency crises as low-income countries about twice as much likely as high-income countries to experience such negative events. This quasi-monotonic relationship between the occurrence of crises and the income level does not seem to hold in the sub-groups of diversified countries. Moreover, in many banking and currency crises are more likely to occur in diversified countries than in the corresponding entire income group. These facts tend to show that the extent to which diversified countries endure lower losses and/or recover faster has more to do with a greater

resilience capacity diversified economies than with a predisposition these countries to experience less crises.

	Financial crises			
	Bank		Currency	
	Full	*Diversified*	*Full*	*Diversified*
All countries	5	9	18	15
Low income	6	5	25	25
Lower middle income	5	11	19	13
Upper middle income	4	8	16	16
High income	5	8	13	17

Table 2. Occurrence of financial crises

5. Potential endogeneity of crises

5.1. IV-LP estimation

Equation 2 assumes no feedback from GDP fluctuations on the probability of crises. Cerra & Saxena (2008) raise concerns about such assumption as they argue that contemporaneous and lagged effects of output growth on the occurrence of crises are plausible. McCord et al. (2015) show that in the aftermath of the 2007-08 crisis, the U.S banking sector registered a 14 percent shrinkage in the number of independent commercial banks. This drop consisted in bank failures as well as in a reduction in the number of newly formed banks (i.e. from an average of 100 new banks per year since 1990 to about 3 banks per year around 2010). This sharp fall in the number of active banks and new entrants resulted from weak economic conditions during the crisis and over the recovery period, from lower bank profitability due to the Fed's policy of keeping the federal funds rate near zero since 2008 and thus pushing lending rates and bank interest margins down, and from higher compliance costs for newcomers due to tighter regulatory restrictions after the crisis. These findings tend to support the idea of potential impacts of output losses of the probability of banking crises as bank failures and drops in the number of new banks represent important signs of distress in the banking sector.

Kaminsky (2003) argues that although currency crises are not created equal, in many cases they are associated with weak economic fundamentals. This goes in the sense of a relationship between GDP fluctuations and the probability of currency crises. Nevertheless, the author insists on the wide variety of currency crises determinants, including a self-fulfilling component especially in advanced economies.

To account for potential endogeneity of crises, an alternative estimation model in the fashion of Heckman (1978) dummy endogenous variable model is specified. Following Wooldridge (2010), a two-steps procedure is implemented. In the first step, a binary response model $Pr(D_{i,t} = 1 \mid \boldsymbol{g},\boldsymbol{D}) = F(g_{i,t-j},D_{i,t-s})$ (with $D_{i,t}$, a dummy variable and $g_{i,t}$, a continuous control variable) is estimated by maximum likelihood. In the second step, the fitted probabilities $\hat{F}_{i,t}$ are used as instruments in a two-stage least squares (2SLS) estimation of the local projections. Note that as $\hat{F}_{i,t}$ is used as instrument for $D_{i,t}$, it is not required for $Pr(D_{i,t} = 1 \mid \boldsymbol{g},\boldsymbol{D})$ to be correctly specified. This provides some latitude in the specification of the model. Following Cerra & Saxena (2008), a probit model is specified for the first step as follows:

$$Pr(Shock_{i,t} = 1) = F\left(\mu + \sum_{j=0}^{p} \gamma_j g_{i,t-j} + \sum_{s=1}^{q} \phi_s Shock_{i,t-s} + \nu_{it}\right), \quad (3)$$

where $g_{i,t}$ is the GDP growth rate. Note that contemporaneous as well as lagged potential effects of GDP fluctuations on the probability of crises are considered.

Figures 6 and 7 display the cumulated IRFs of resulting from the instrumental variable local projections (IV-LP) estimations for banking and currency crises respectively. A comparison between these new IRFs to figures 4 and 5 shows that the main specification tends to underestimate the impact of both crises on growth. Figure 6 shows deeper output losses for all income groups, and significant losses for upper middle-income countries due to banking crises in contrast with the main specification. Moreover, unlike Cerra & Saxena (2008) and Laeven & Valencia (2018), these results show that high-income countries do not experience the deepest and most persistent output losses due to banking crises comparted to the other income groups. Rather, it seems that the negative effects of banking crises decrease as the income level increases. Despite these discrepancies between the two models, likewise the IRFs from equation 2, the IV-LP estimations show lower depth and/or persistency of output losses due to banking crises in diversified countries compared to the corresponding income group average, except for low-income countries.

Like in the main specification, the responses to currency crises estimated with the IV-LP model show high persistency of output losses in all income groups. With this alternative specification, diversified countries appear to be better off than the average in terms of persistency and/or depth of output losses as shown in figure 7.

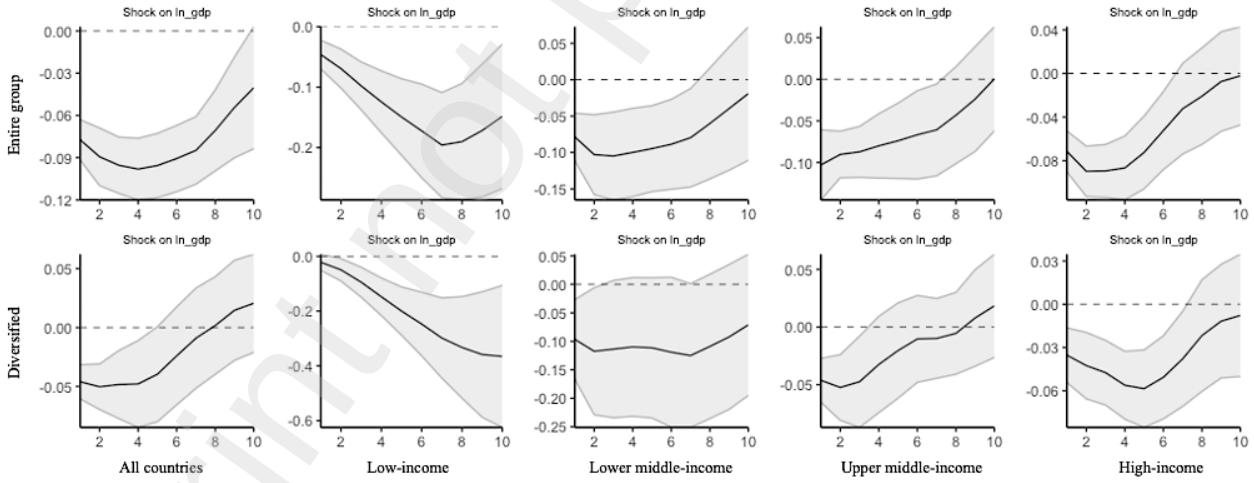

Figure 6. Cumulated IRFs of log GDP to banking crises estimated via IV-LP.

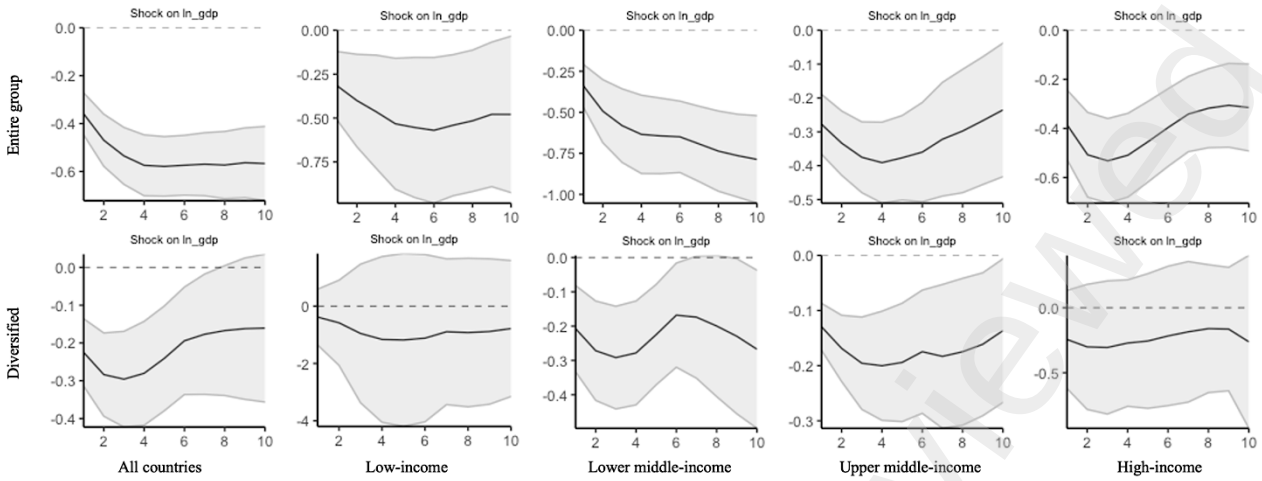

Figure 7. Cumulated IRFs of log GDP to currency crises estimated via IV-LP.

5.2. Relevance of instruments

It should be noted that the IRFs coefficients in response to currency crises when accounting for potential endogeneity of currency crises are about ten times wider than those resulting from the main specification. On average, cumulated output losses amount to nearly 60 percent over the 10-year horizon compared to the base year, reaching more than 75 percent for lower middle-income countries. These estimates raise questions about the relevance of the probability of currency crises as instrument. Tables 3 and 4 display the IV-LP coefficients for all horizons along with the results of Kleibergen-Paap (KP) test for relevance of instruments for banking and currency crises respectively. Although the values of the KP test are systematically way beyond the thumb-ruled critical value of 20, showing relevance of banking crises probabilities as instrument, the same does not apply for currency crises probabilities. These latter appear to be more relevant as instrument in upper middle-income countries, both for the group average and for the sub-group of more diversified countries, than in any other income group. This is consistent with Kaminsky (2003) as the author argues that currency crises are more likely to be due to economic fundamentals in emerging countries than in mature economies where the self-fulfilling nature of currency crises is more important. The KP test shows no endogeneity of currency crises in low-income countries, as well as in diversified lower middle- and high-income countries.

Responses	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*	*h=6*	*h=7*	*h=8*	*h=9*	*h=10*
A. Full sample										
Banking crisis	-0.0774***	-0.0894***	-0.0954***	-0.0981***	-0.0956***	-0.0907***	-0.0848***	-0.0707***	-0.0543***	-0.0404**
Kleibergen-Paap	1012	1012	1012	992.1	970.5	938.5	924.8	949.6	896.4	825.4
Diversified										
Banking crisis	-0.0461***	-0.0503***	-0.0484***	-0.0479***	-0.0396***	-0.0240	-0.00902	0.00170	0.0146	0.0206
Kleibergen-Paap	422.5	422.5	422.5	413.4	402.4	388.7	385	422.7	389.6	328.8
B. LI countries										
Banking crisis	-0.0462***	-0.0693***	-0.0979***	-0.124***	-0.149***	-0.172***	-0.196***	-0.190***	-0.172***	-0.148***
Kleibergen-Paap	258	258	258.2	247.8	237.9	230.3	229.8	228.7	227.6	226.4
Diversified										
Banking crisis	-0.0216	-0.0494**	-0.0945***	-0.148***	-0.200***	-0.247***	-0.298***	-0.333***	-0.359***	-0.366***
Kleibergen-Paap	84.20	84.20	84.20	83.94	83.64	83.32	82.99	82.64	82.24	81.81
C. LMI countries										
Banking crisis	-0.0787***	-0.103***	-0.105***	-0.0999***	-0.0947***	-0.0887**	-0.0797**	-0.0602	-0.0396	-0.0189
Kleibergen-Paap	257.7	257.7	257.7	248.6	236.2	221.8	223.6	223.7	218.3	217.4
Diversified										
Banking crisis	-0.0967***	-0.117**	-0.114*	-0.110	-0.111*	-0.119*	-0.125*	-0.109	-0.0923	-0.0710
Kleibergen-Paap	164.8	164.8	164.8	151.8	133.4	112.8	117.6	116.3	115	129.1
D. UMI countries										
Banking crisis	-0.103***	-0.0903***	-0.0872***	-0.0800***	-0.0739***	-0.0667***	-0.0608**	-0.0432*	-0.0238	0.000553
Kleibergen-Paap	123.6	123.6	123.6	122.8	122	121	120	118.9	117.7	116.7
Diversified										
Banking crisis	-0.0462***	-0.0524***	-0.0475**	-0.0325	-0.0204	-0.0103	-0.00988	-0.00550	0.00789	0.0184
Kleibergen-Paap	70.07	70.07	70.07	69.70	69.31	68.88	68.39	67.84	67.21	66.50
E. HI countries										
Banking crisis	-0.0716***	-0.0897***	-0.0894***	-0.0866***	-0.0725***	-0.0524***	-0.0323**	-0.0209	-0.00738	-0.00218
Kleibergen-Paap	749.1	749.1	749	738.6	729	720.2	690.8	729.8	659.8	524.8
Diversified										
Banking crisis	-0.0354***	-0.0426***	-0.0475***	-0.0562***	-0.0586***	-0.0507***	-0.0379***	-0.0217	-0.0117	-0.00770
Kleibergen-Paap	113.6	113.6	113.6	110.4	106.8	102.6	97.85	99.65	96.32	77.05

Table 3. Cumulated responses to banking crises estimated via IV-LP and Kleibergen-Paap test.

Responses	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*	*h=6*	*h=7*	*h=8*	*h=9*	*h=10*
A. Full sample										
Currency crisis	-0.359***	-0.469***	-0.535***	-0.574***	-0.579***	-0.574***	-0.570***	-0.573***	-0.563***	-0.567***
Kleibergen-Paap	109.4	109.4	109.4	106.4	104.1	103	99.01	94.51	90.28	83.41
Diversified										
Currency crisis	-0.225***	-0.284***	-0.296***	-0.280***	-0.241***	-0.194***	-0.177***	-0.167***	-0.162**	-0.161**
Kleibergen-Paap	21.49	21.49	21.49	20.64	20.26	20.51	19.48	18.86	17.58	15.95
B. LI countries										
Currency crisis	-0.319***	-0.401***	-0.464***	-0.533***	-0.554***	-0.570***	-0.541***	-0.516***	-0.479***	-0.480***
Kleibergen-Paap	13.46	13.46	13.46	13.28	13.09	12.71	12.52	12.21	12.08	11.58
Diversified										
Currency crisis	-0.380	-0.582	-0.952	-1.160	-1.180	-1.117	-0.892	-0.921	-0.884	-0.781
Kleibergen-Paap	0.363	0.363	0.363	0.371	0.384	0.402	0.401	0.398	0.394	0.389
C. LMI countries										
Currency crisis	-0.340***	-0.493***	-0.581***	-0.634***	-0.644***	-0.649***	-0.693***	-0.737***	-0.764***	-0.787***
Kleibergen-Paap	25.97	25.97	25.97	25.56	25.25	25.68	25.26	24.42	24	22.61
Diversified										
Currency crisis	-0.207***	-0.272***	-0.292***	-0.278**	-0.225**	-0.168*	-0.174*	-0.200*	-0.230*	-0.267*
Kleibergen-Paap	8.649	8.649	8.649	8.582	8.486	8.664	8.451	8.346	8.256	8.110
D. UMI countries										
Currency crisis	-0.278***	-0.333***	-0.375***	-0.391***	-0.377***	-0.360***	-0.322***	-0.298***	-0.267***	-0.235***
Kleibergen-Paap	68.43	68.43	68.43	66.46	65.17	65.12	62.41	58.93	55.43	51.66
Diversified										
Currency crisis	-0.129***	-0.169***	-0.196***	-0.200***	-0.194***	-0.175***	-0.183***	-0.175***	-0.161***	-0.136**
Kleibergen-Paap	26.93	26.93	26.93	25.97	25.50	27.02	25.66	24.05	22.43	20.38
E. HI countries										
Currency crisis	-0.387***	-0.507***	-0.532***	-0.509***	-0.454***	-0.396***	-0.341***	-0.318***	-0.306***	-0.315***
Kleibergen-Paap	29.79	29.79	29.79	28.88	28.06	27.07	26.35	25.78	24.41	23.19
Diversified										
Currency crisis	-0.244	-0.301	-0.306	-0.272	-0.256	-0.217	-0.185	-0.161	-0.164	-0.262
Kleibergen-Paap	0.846	0.846	0.846	0.816	0.782	0.742	0.703	0.663	0.624	0.586

Table 4. Cumulated responses to currency crises estimated via IV-LP and Kleibergen-Paap test.

6. Conclusions

The recent literature on economic recovery tends to converge to a consensus on the fact that the economic fundamentals of countries, reflected in the income level, affect the countries' abilities to absorb shocks and the pace at which output losses are recovered if recovery ever occurs. Moreover, it appears from the literature that the nature of crises may have an influence on the persistency of output losses regardless of the income level. On the other side, studies on economic diversification, as well as common wisdom, appear to associate higher levels of diversity with greater stability and growth, at least up to a certain threshold. This paper mixes both investigation grounds by comparing the resilience to banking and currency crises of countries with different income and export diversity levels.

The results show that on average, currency crises have more persistent negative effects on output than banking crises. For all income groups, departures from pre-crisis output growth trends appear to never be fully reversed on average after currency crises, while in most cases (except for low-income countries) recovery is observed within a 10-year horizon after the occurrence of a banking crisis. Unlike some previous studies such as Cerra & Saxena (2008) and Laeven & Valencia (2018), this paper shows a negative relationship between the income level and the capacity of countries to absorb and recover from banking crises. This negative relationship is also observed on average after currency crises when low-income countries are put aside.

In most cases, more diversified economies appear to experience lower output losses and/or faster recovery than the average independently of the income group and the type of crisis. Low-income diversified countries seem to be an exception to that pattern as they exhibit deeper output loss than the average of the income group and show no sign of recovery.

Overall, the findings of this paper tend to advocate in favor of more diversification as such strategy appears to enhance resilience to shocks. Although the literature shows some incentives to re-concentrate after a certain threshold of development, it seems that the capacity of diversity to cushion output losses and foster recovery from crises does not decay as the income level increases. However, these results do not rule out the hypothesis of a U-shaped relationship between income level and diversification. A potential hypothesis to reconcile these two rather conflicting outcomes may be that the trade-off between growth and stability mentioned by Wagner & Deller (1998) varies with the income level. The U-shaped hypothesis and the findings of the current analysis tend to show that for countries at early stages of development, diversification can serve both goals of growth and stability. Indeed, the U-shaped hypothesis predicts that diversification is a dominant strategy for such countries, while the results of this paper show lower output losses and/or faster recovery for low- and middle-income countries after crises (except for low-income countries in case of banking crisis). For more advanced economies, although re-concentration becomes a better strategy for in terms of growth as predicted by the U-shaped hypothesis, it may not be the case in terms of stability. As stability is linked to the ability of countries to absorb and recover from adverse shocks, the resilience enhancing capacities of diversification observed in the current analysis for high-income countries remain valid. This tends to show that the trade-off between growth and stability may occur to be a harder choice to operate for decision makers in advanced economies as both objectives become increasingly conflicting as income increases.

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