Ryan Banerjee
ryan.banerjee@bis.org

Giulio Cornelli
giulio.cornelli@bis.org

Egon Zakrajšek
egon.zakrajsek@bis.org

Technical Annex: "The outlook for business bankruptcies"

To formally assess the implications for business bankruptcies embedded in economic growth and Moody's one-year expected default frequencies (EDFs), we estimate three panel regression specifications. In all specifications, the dependent variable is the logarithm of the total number of business bankruptcies in country *i* during year *t*. The main explanatory variable in the first specification is contemporaneous country-specific real GDP growth; the second specification instead uses the median one-year EDF in country *i* at the end of year *t*–1; and the third specification includes both contemporaneous real GDP growth and lagged median one-year EDFs as explanatory variables.[1]

Because business bankruptcies are persistent over time, all three specifications also include one lag of the dependent variable. Further, we include country fixed effects, which control for the fact that the average level of bankruptcies varies significantly across countries in our sample, owing to differences in creditor rights and other aspects of countries' insolvency regimes (Claessens and Klapper (2005)).[2] We estimate these specifications by ordinary least squares (OLS), using the available data from 13 advanced economies (AEs) between 1999 and 2019, for a total of 258 country-year observations.

In both statistical and economic terms, contemporaneous real GDP growth and lagged one-year EDFs are important predictors of business bankruptcies in our sample of AEs over the past two decades. Quantitatively, our estimates imply that a decline in real GDP growth of 1 percentage point is associated with an increase in business bankruptcies of 4% during the same year (Table A1, column 1). A 1 percentage point rise in the median year-ahead EDF is associated with an increase in business bankruptcies of about 5% during the subsequent year (column 2). Because business bankruptcies are estimated to be quite persistent over time, these estimates imply significantly larger long-run effects: a 1 percentage point decline in real GDP growth is associated with an increase in business bankruptcies of about 35% in the long run, whereas the corresponding effect of a 1 percentage point rise in one-year EDFs is more than 45%.

Importantly, contemporaneous economic growth and lagged one-year EDFs largely contain complementary information that helps predict business bankruptcies in AEs. This is shown by the fact that the estimated coefficients on real GDP growth and one-year EDFs remain roughly unchanged – and statistically significant – when both variables are used to predict the number of bankruptcies (column 3). In addition, this regression fits the historical data quite well, explaining 97% of the variation in business bankruptcies across countries and time.

[1] We use the Moody's CreditEdge firm-level database to calculate the country-specific median one-year EDFs from 1999 to 2019. Specifically, for each country, we compute the median one-year EDF across all non-financial firms at the end of year t (ie the end of December). We use the median – as opposed to the mean – one-year EDFs because the cross-sectional distribution of EDFs is skewed and has a long right tail. In addition, the number of non-financial firms included in the CreditEdge database can be fairly small for smaller countries in our panel and, in those instances, the median provides a more robust measure of the central tendency of the data than the average.

[2] See S Claessens and L Klapper, "Bankruptcy around the world: explanations of its relative use", American Law and Economics Review, vol 7, no 10, February 2005, pp 253–83.

Real GDP growth and EDFs predict business bankruptcies

Table A1

	Forecasting specification		
Explanatory variables	(1)	(2)	(3)
Real GDP growth	–0.040***		–0.037***
	(0.007)		(0.007)
Lag median one-year EDF		0.055***	0.037***
		(0.014)	(0.013)
Lag ln (No of bankruptcies)	0.888***	0.883***	0.876***
	(0.037)	(0.044)	(0.040)
Long-run effects:			
Real GDP growth	–0.357***		–0.301***
	(0.126)		(0.109)
Lag median one-year EDF		0.470***	0.302***
		(0.166)	(0.109)
Adjusted R^2	0.964	0.969	0.970
Observations	258	258	258

The panel comprises annual data from 1999 to 2019 from AU, BE, CH, DE, DK, ES, FR, GB, IT, JP, NL, SE and US. The dependent variable in all forecasting specifications is ln (No of bankruptcies), the logarithm of the number of business bankruptcies in country *i* during year *t*. All specifications include country fixed effects and are estimated by OLS. Robust standard errors are reported in parentheses; *** denotes statistical significance at the 1% level.

Sources: Consensus Economics; Datastream; Moody's CreditEdge; national data; authors' calculations.