

Reducing non-performing loans:
Stylized facts
and economic impact

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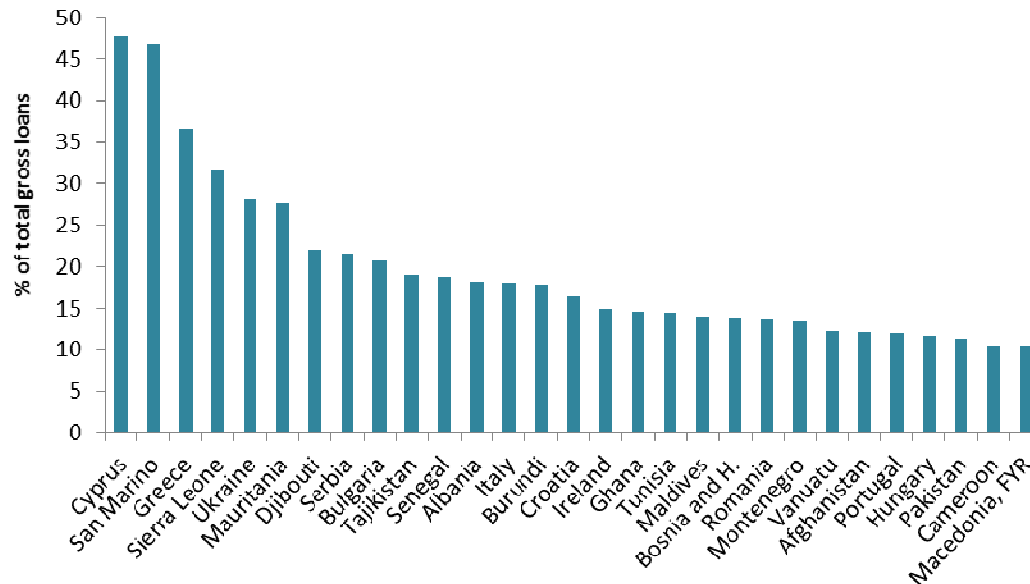
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NPLs at the forefront of policy debate from India to Italy

- A decade after the 2008-09 crisis, bank balance sheets re clogged with NPLs
 - In contrast with earlier experiences
 - Both EMs and advanced economies affected: NPLs of ~ 40% in Greece, 15%+ in Italy
- Little knowledge of how a typical case of high NPLs unfolds, vs literature on
 - Typical aftermaths of a financial crisis (eg Reinhart and Rogoff, 2014)
 - A currency crisis (eg Hong and Tornell, 2005)
 - Fiscal consolidation episodes (eg Alesina et al., 2015)

Countries with NPL ratio above 10%



The evidence on effectiveness of financial sector policies in terms of dealing with NPLs is equally scarce

- Much is informed by case studies: US '80s (savings and loans crisis), Nordics/Japan in early '90s; Mexico/Korea/South-East Asia in late '90s
 - Kliengibel, 2000; Calomiris et al., 2004; Macey, 1999; Krueger and Tornell, 1999; Woo, 2000; Fung et al., 2004; Jonung, 2009; Hoshi and Kashyap, 2010
 - Quantification of fiscal costs of post-crisis government support, including NPL write-offs (Honohan and Kliengibel, 2003)
 - Baudino and Yun (2017) a recent summary of lessons
 - Debate in Europe has been strongly influenced by competition policy / minimizing state aid
- Insightful but do not reveal how/whether various policies worked in an *average case*

Evidence on macroeconomic effects of NPLs is extensive but primarily qualitative

- A burden for the debtor: traps collateral, complicates obtaining new credit (eg Bernanke et al., 1999)
- A burden for the creditor
 - Ties up capital, drag on profitability
 - Contracts credit supply
 - Distorts allocation of credit
 - Worsens business confidence
 - Kwan and Eisenbeis (1995); Cucinelli (2015); Jorda, Schularick and Taylor (2013); Peek and Rosengren (2000, 2005); Caballero et al., 2008
- Estimates of macro-level impact of high NPLs are few, predominantly derived from VAR, complicating causal interpretation
 - Nkusu, 2011; Espinoza and Prasad, 2010; Klein, 2013; Kaminsky and Reinhart, 1999, re predicting crises

Contributing to the literature by closing these three gaps

1. Distil key stylised facts about instances of high NPLs since 1990 in a large global sample
 2. How are NPL policies related to the trajectories of NPLs? -- insights into the average effectiveness of various policies
 3. Impact of reducing NPLs on growth -- comparing instances of sharp reduction in NPLs with the counterfactual derived from episodes where high NPLs persisted
- Tackle causality by focusing on sharp reductions in NPLs and using matching technique to compare their aftermaths with plausible counterfactuals
 - NPLs often reflect downturn; fast growth can lead to a faster drop in NPL ratio
 - Also focusing on NPL reductions as opposed to any changes (in VAR)
 - Contributing to the literature on debt relief
 - Sovereign debt relief \uparrow growth by 5 pp p.a. (Reinhart and Trebesch, 2016)
 - Similar: drops in NPL ratio result from restructuring/writing off a large number of smaller (private-sector) liabilities

7 facts about NPLs

- NPLs are not just a by-product of (well-studied) crisis episodes
 - Rarely precede a crisis; only 40-48% of NPL cases can be linked to a banking / currency / sovereign debt crisis
- NPL levels today are not exceptional
 - But instances are now less acute -- more “chronic”
- Episodes of high NPLs typically last 6 years, some 17 and ongoing; NPL reductions only start once NPLs hit 21% (median)
- Countries adopt NPL policy packages; combo of public funds (bailouts) + asset management companies (elements of market-based solution) works best
 - Bailouts on their own don’t seem to work [within 3 years]; AMCs on their own are only 40% as effective
- A typical reduction episode starts NPL stock ↓↓, typically a “steep” phase at the start (5pp+ in a year)
 - Credit expansions rarely kick-start NPL reductions, their median contribution is only 20%.
 - They may make decisive contribution (70%+) when financial sectors are shallow (median credit-to-GDP < 15% vs. 45% for persistent NPLs)
- Once a steep drop in NPLs occurs, economic growth improves by around 1.5 pp a year over several years
 - Effect from year 2, peaking by year 4
 - Reflected in higher investment growth
- Returns (NPV of future value added) on NPL reduction policies can be high, but
 - Costs are upfront making NPL policies unattractive with short political horizons
 - Strong administrative capacity is required to implement effective packages eg targeting market for NPLs

Novel dataset on NPLs in 190+ countries over 27 years, identifying episodes of high NPLs, and NPL policies

- NPL dataset splices bank-level data from Bankscope covering 90% of banks by assets + country-level data
- The policy database draws on various existing databases
 - As well as narrative evidence collected from various policy reports
- Construction of NPL episodes draws on the event study methodology, eg impact of fiscal consolidation
 - Distinguishing between expenditure-based vs. tax-based events, (Beetsma et al.,2014, Guajardo et al.,2014, and Alesina et al., 2015)

Complementing other studies of the impact of NPLs

- GDP growth as the main driver of NPLs
 - Beck, Jakubik & PiloIU (2003); Espinoza & Prasad, 2010
 - Sustained growth above 1.2% in Italy needed to half NPL ratio over 5 years (Mohaddes et al., 2017)
 - Country studies for Greece (Louzis, Vouldis and Metaxas, 2012), Spain (Salas and Saurina, 2002), Italy (Quagliariello, 2009) and Mexico (Blavy and Souto, 2009), etc
- High NPL ratio a significant predictor of bank failure
 - e.g. Lu & Whidbee, 2013; Gonzales-Hermosillo et al., 1997; Lu and Whidbee, 2013; Barr et al., 1994
 - NPLs impact negatively on a bank's cost structure and efficiency (Maggi and Guida, 2009)
 - And their willingness to lend (Cucinelli (2015); Hou & Dickinson, 2007)
- Misallocation of credit where bank-business linkages are strong
 - “Zombie lending” helps to prevent second-round business failures at the expense of starving more productive parts of the economy (see Peek and Rosengren, 2005; Caballero et al., 2008).
 - Large capital injections in banks are required to break this vicious circle (Giannetti and Smirnov, 2013)
- VAR estimation yields a negative impact of NPLs on GDP growth, unemployment and inflation
 - Effect is assumed to be symmetrical + not linked to the nature of NPL reduction; identification relies on assumptions about the order of variables
 - Nkusu (2011), Espinoza & Prasad (2010); Klein (2013)

Constructing data on NPL ratios: Splicing cross-country WDI data and bank-level Bankscope data

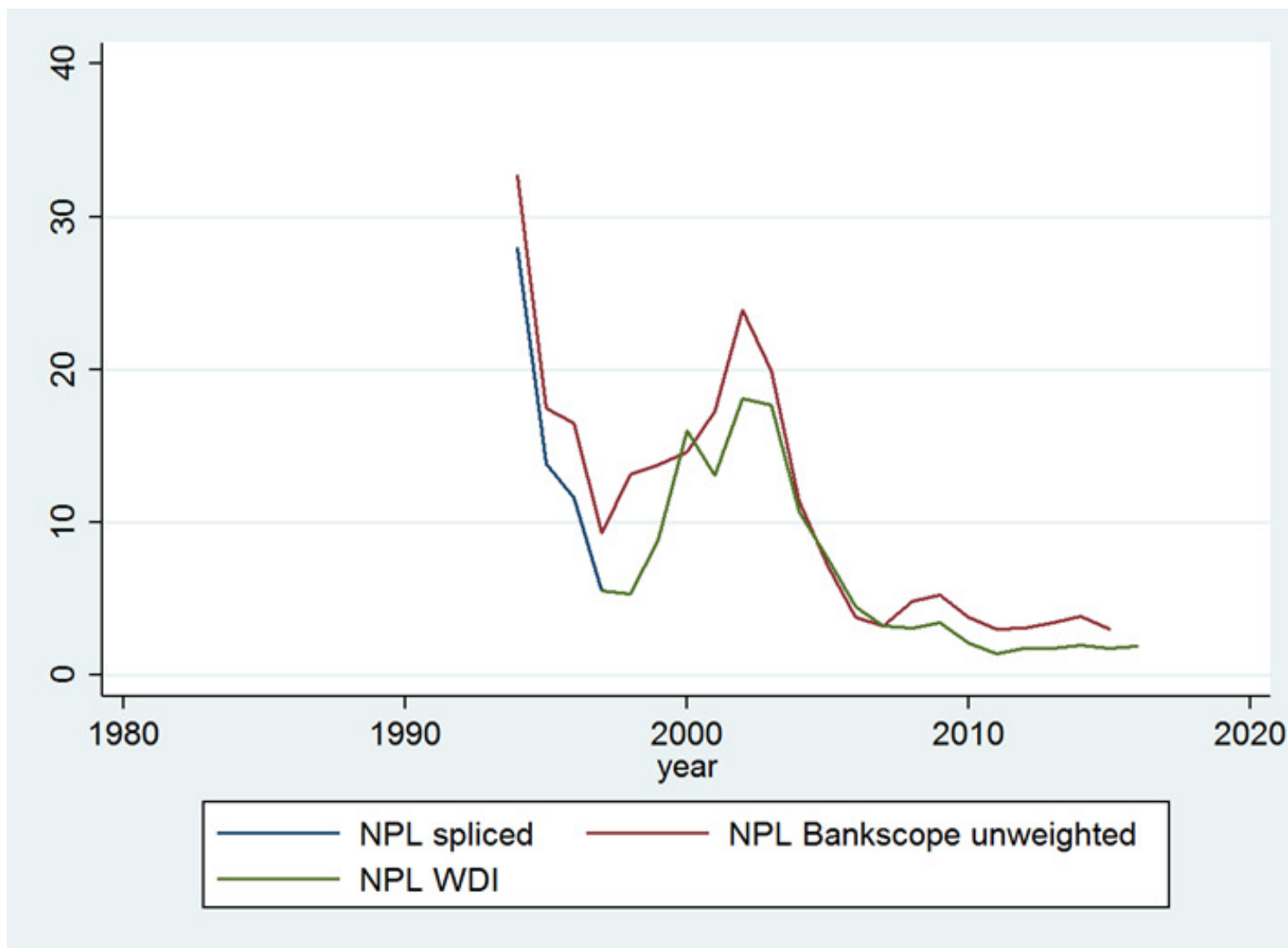
- Principal or interest are at least 90 days in arrears (but not strictly internationally comparable)
- Analysis conditional on authorities willing to recognize the problem
- Use World Bank's WDI (130 countries, unbalanced 1997-2016) cross-checked with the New Dataset on Financial Structure and Development (Beck et al., 2000, updated)
- Complement with bank-level Bankscope aggregated to country level (190 countries, better coverage for 1990-2015)
- Use splicing based on de la Fuente Moreno (2014) by extending WDI backward when Bankscope is available, using growth rate of NPLs to retropolate the spliced series and apply correction:

$$\widehat{NPL}_t^S = NPL_t^{WDI} + \ln\left(\frac{NPL_T^{WDI}}{NPL_T^{BS}}\right) \rho^{\frac{T-t}{t}} \text{ where } T \text{ is the linking year and } \rho = 0.3$$

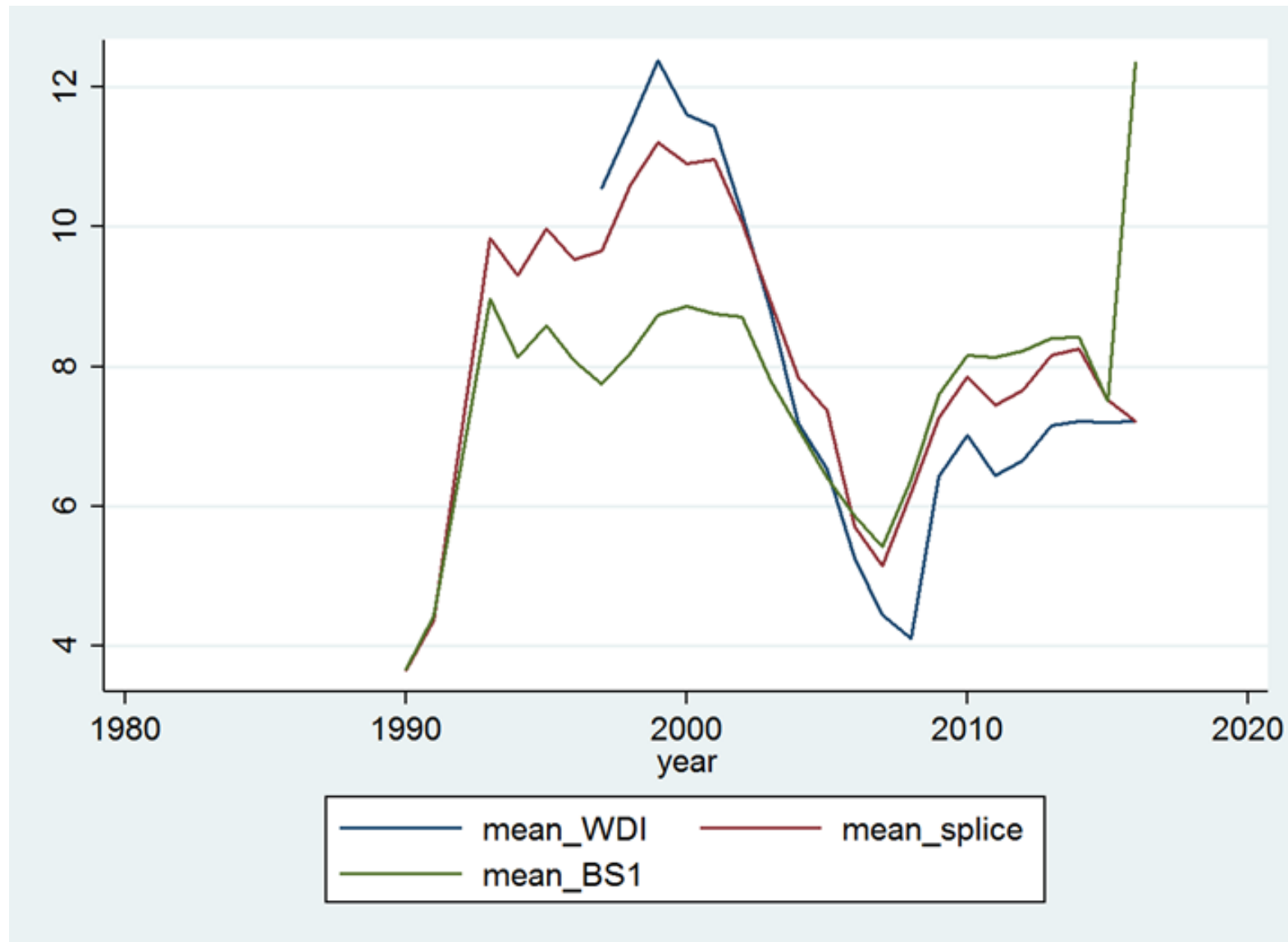
- For countries in Bankscope only, apply average distance WDI-to Bankscope at all linking points:

$$\widehat{NPL}_t^S = \exp\left[\ln(NPL_t^{BS}) + \frac{1}{N_T} \sum \ln\left(\frac{NPL_T^{WDI}}{NPL_T^{BS}}\right)\right]$$

Data splicing: An example for Argentina



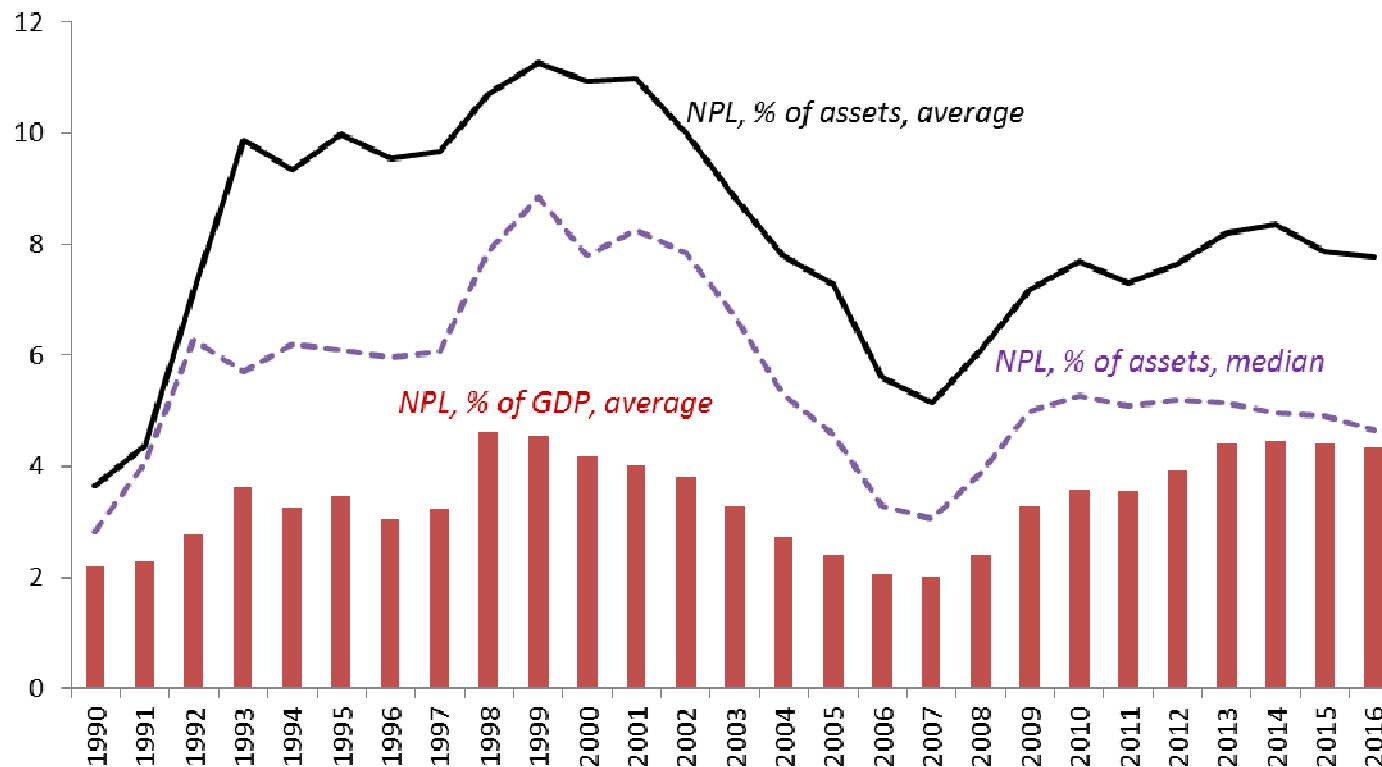
Final sample: 3,537 country-year observations in 194 countries between 1990-2016



NPLs today: magnitude is not unprecedented. Yet “acute” problem in the past has become “chronic”

- Average NPLs spiked in 1999 at 12% in the immediate aftermath of the Asian/Russian crises, declined swiftly
- Build-up post 2008-09 slower, to 8%+ on average – but persistent

Average and median NPL ratios



Episodes of high NPLs are of interest on their own -- more than just by-products of (well-studied) crises

- Only 40-48% of instances of high NPL ratios (7%+) can be linked to a systemic banking / currency / sovereign debt crisis in 1990-2012 (using Laeven and Valencia, 2012)
- The reverse is also true: 38% of banking crises were followed by high NPLs
- Take 7% as baseline definition of high NPLs (today's median + 2.5%)
- High NPL episodes are common, tend to last 6 years on average, but some are 17 and ongoing
- 165 out of 190 countries experienced high NPLs

Financial sector policies targeting NPLs

- (1) Establishment of an asset management company – to purchase NPLs from banks at “market” value
 - AMCs can securitise and resell , use expertise to partially recover bad loans or initiate foreclosure
 - Majority are publicly funded but banks may also establish internal AMCs; sometimes deposit insurances funds are used
 - Data from Building Better Bad Banks (Hallerberg and Gandrud, 2015); where data on closure is not available average life span of 8 years is assumed
 - 139 cases of AMCs (109 public, 20 internal, 8 backed by deposit insurance; 2 unclassified) across 62 countries during 1990-2016
- (2) Provision of bailouts to the financial sector (for instance, public funds for bank recapitalisation)
 - Based on Bova, Ruiz-Arrenz, Toscani & Ture (2014)
 - 95 cases across 66 countries with the average fiscal cost of 9.4% of GDP
 - Bailouts in non-financial sectors (PPPs, regions, SOEs) can be used as placebos

Other financial sector policies targeting NPLs

- (3) Changes to macroprudential regulation
 - Cerutti, Claessens and Laeven (2015): eg limits on leverage, maximum interbank exposures, concentration ratios, capital surcharges on systemically important financial institutions, reserve requirements
 - Can also target borrowers by imposing limits on loan-to-value or debt-to-income ratios
 - Increases in macroprudential policy index (MPI) = tightening
 - 119 countries in 2000-13; 135 cases of tightening in 76 countries. Loosening only in Bulgaria ('08) and Serbia ('13)
- (4) Changes to loan classification
 - Barth et al, 2014, proxied by the number of days of after which a loan is classified as sub-standard, doubtful or lost (4 months to 3 years, average 18 months)
 - Surveys of 127 central banks conducted in 1999, 2003, 2007 and 2011 (extrapolated).
- (5) Changes to provisioning stringency
 - Barth et al, 2014: Sum of the minimum required provisions as loans become substandard, doubtful and loss (average 120%).
- (6) Other (eg changes in tax treatments of NPLs)

Identifying episodes of reduction in NPL ratio: A drop of at least 7% (also robustness checks)

- 104 episodes when NPL ratios above 7% persisted for 4+ years
- 178 episodes of NPL reduction where NPL ratio ↓ 7 pp+ over the duration
- Interruptions of 1 year disregarded if $\Delta\text{NPL} < 1.6\text{pp}$

Characteristics of episodes of high NPLs

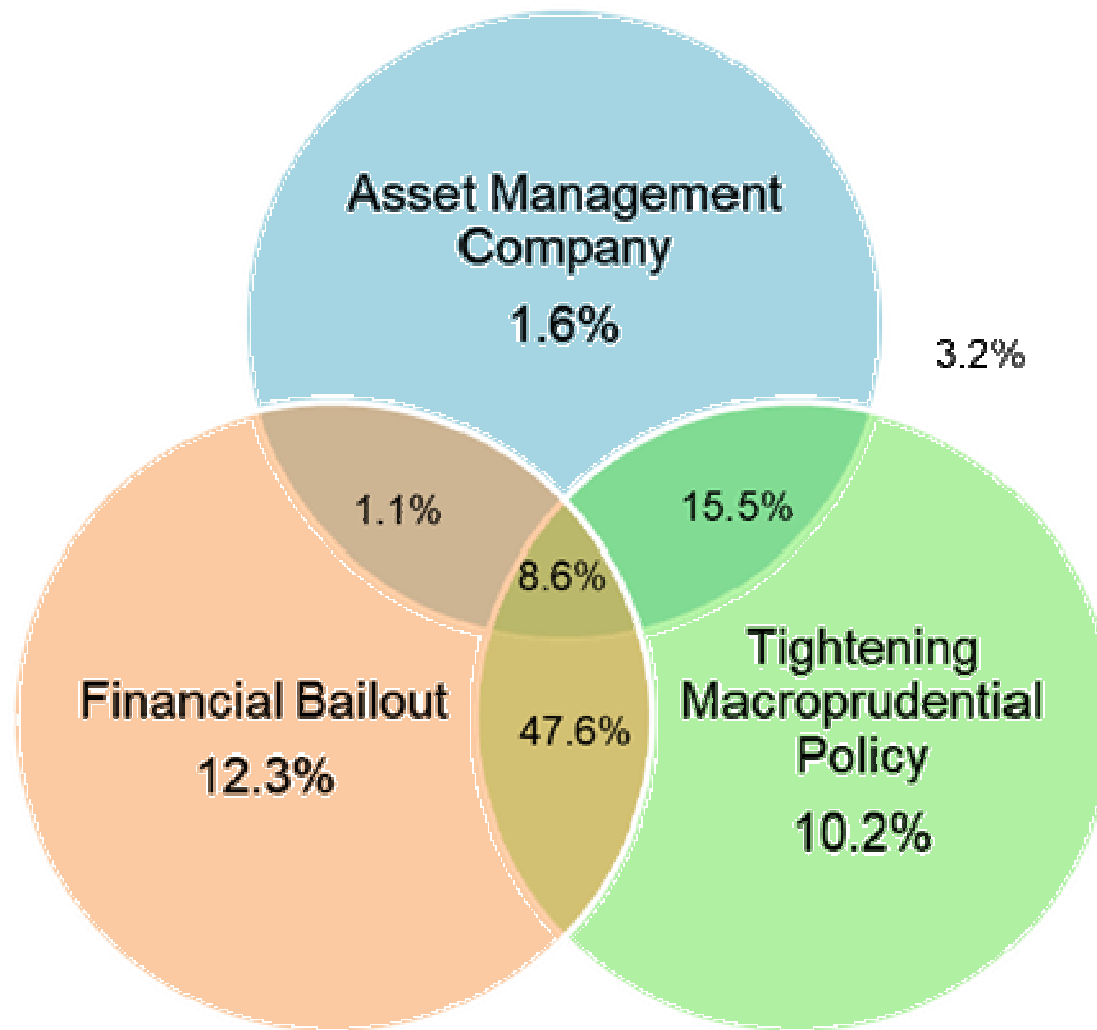
	Mean	St. dev.	Median	Min	Max
<i>High and persistent NPLs</i>					
Length	5.9	2.0	5.5	4.0	17.0
Initial NPL ratio	11.4	5.3	9.5	7.0	42.4
Change in NPL ratio	8.1	8.5	6.8	-6.7	37.0
NPL ratio at the end	19.5	9.9	18.0	7.0	59.8
<i>NPL reduction episodes</i>					
Length	5.8	3.3	5.0	2.0	15.0
Initial NPL ratio	24.0	13.8	21.2	8.0	95.3
Change in NPL ratio	-17.4	10.9	-14.2	-69.4	-7.1
NPL ratio at the end	6.7	7.5	4.4	0.1	66.4

Average values for selected variables, by episode type

	<i>Reductions in NPL ratio</i>			<i>High and persistent NPLs</i>	<i>NPLs not high</i>
	<i>All</i>	<i>With a sharp drop</i>	<i>Other</i>		
NPL ratio (start)	23.92	25.90	13.77	11.37	3.50
NPL ratio (end)	6.64	7.22	3.68	19.45	3.56
GDP per capita at PPP (start)	13,137	11,591	20,816	15,433	19,980
GDP growth (start)	3.02	3.36	1.31	3.11	4.24
Public debt, % GDP (start)	64.19	66.96	53.54	54.20	48.72
Inflation, % (start)	7.19	7.40	6.21	4.72	4.86
Private sector credit, %GDP (start)	31.09	26.79	51.29	45.44	55.30
Annual GDP growth	5.51	5.85	4.46	2.90	3.66
Annual investment growth	9.49	10.40	6.73	4.75	5.12
Annual consumption growth	5.07	5.50	3.78	2.79	3.99
Export growth	7.98	8.59	6.12	5.64	4.70
Unemployment rate (start)	9.76	9.97	8.72	9.61	8.80
Unemployment rate (end)	8.75	9.06	7.22	10.23	8.12
Number of episodes	178	149	29	104	144

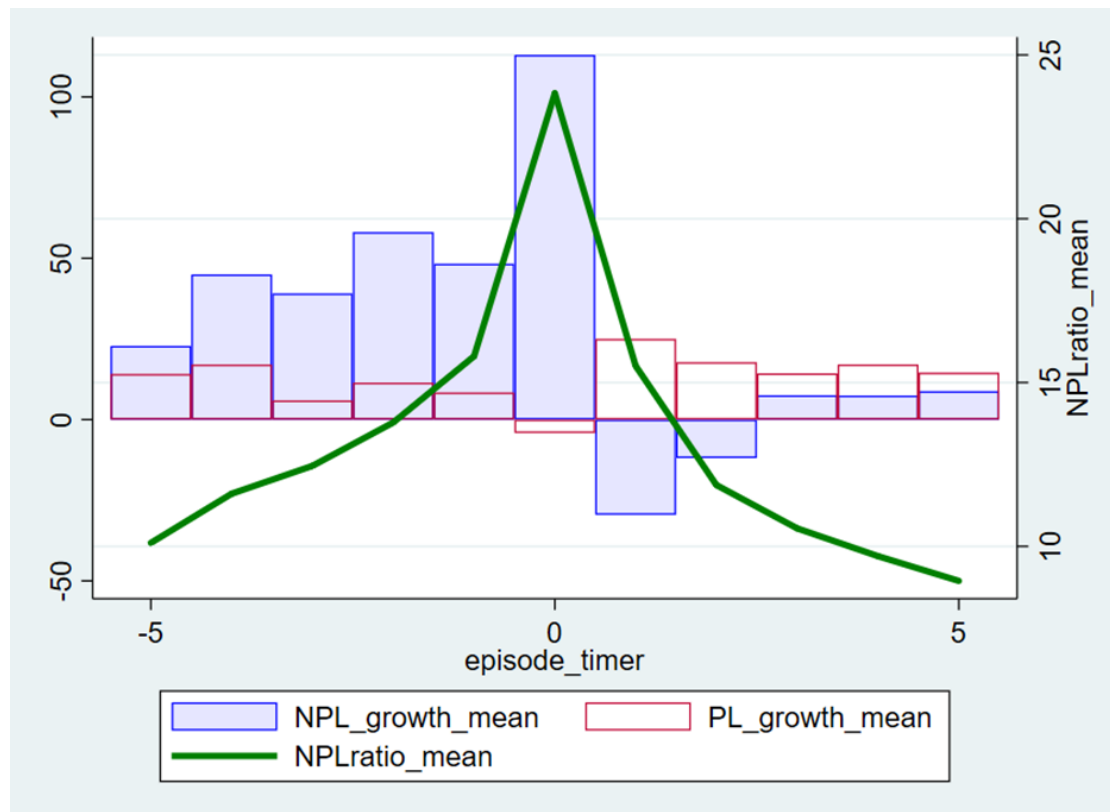
Note: Averages in percent across all years in an episode, unless otherwise indicated. NPL reduction episodes have a minimum drop in NPL ratio of 7 percentage points; episodes of high and persistent NPLs have a minimum duration of 4 years.

**Typically a policy package is eventually adopted:
AMCs come in the presence of bailout funds in $\approx 36\%$ of cases**



A typical reduction episode starts with a sharp drop in NPLs, driven primarily by falling NPL stock

- In later years, credit growth makes a greater contribution
- Can help to identify the impact of NPL reduction (event = sharp drop in NPLs at the start of reduction episode vs. high and persistent)
- A typical episode lasts 5 years; NPL ratio ↓ to 4.4% (median vs 3.5% in countries with no NPL problem)



NPL reductions are sometimes accounted for mostly by credit expansion – but these instances are rare

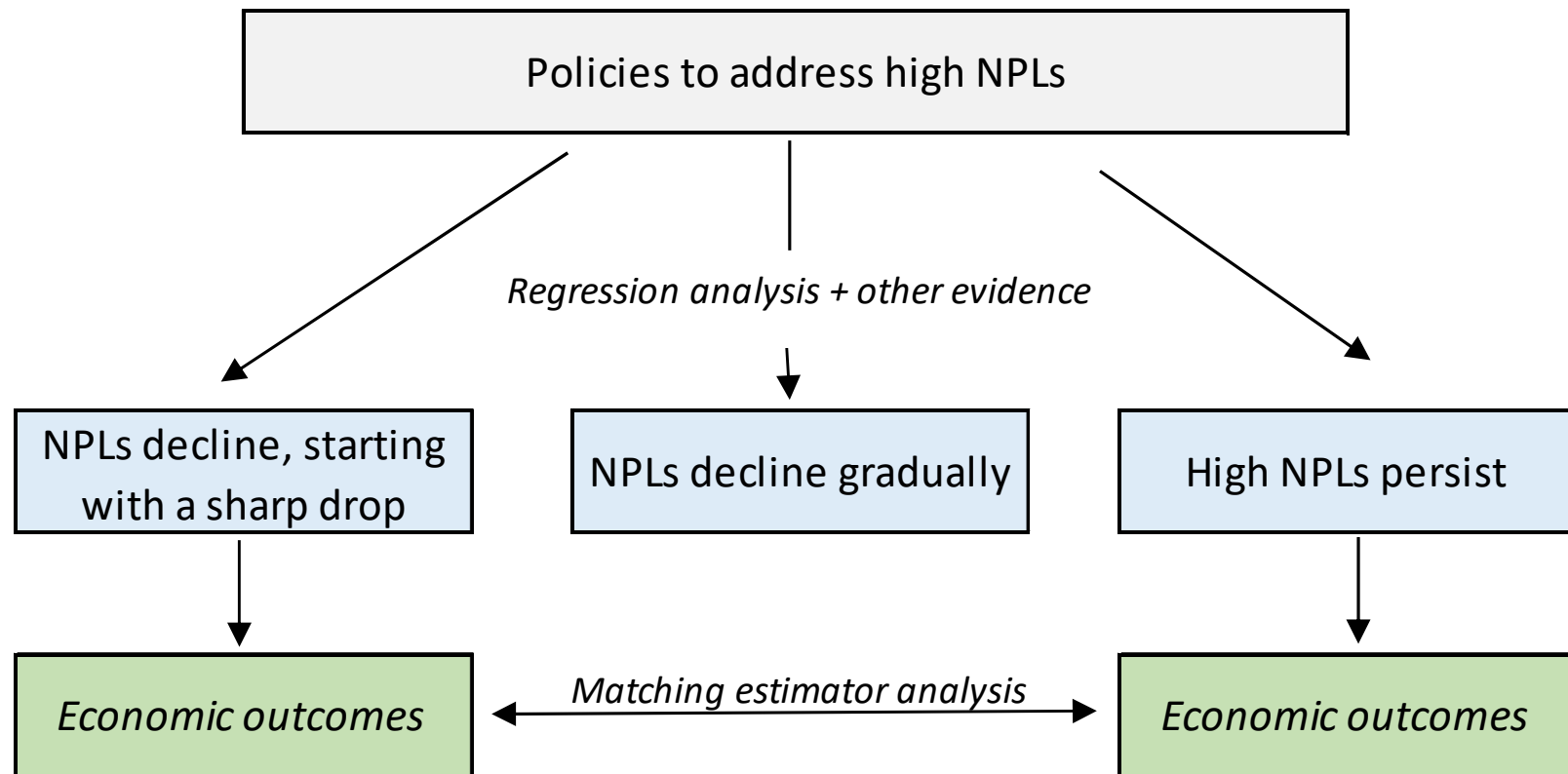
- Compute the relative contributions of the decline in NPL stock and credit growth to the overall magnitude of a reduction in NPL ratio:

$$\text{loans share} = \frac{-\text{overall loans growth}}{\text{overall NPL growth} - \text{overall loans growth}} * 100$$

- Median credit contribution to sharp drops in NPLs is only 20.4%: NPL resolution leads to credit growth much more often than credit growth takes care of NPL problem
- Credit growth makes an 70%+ contribution in <10% of cases
- Predominantly in shallow financial sectors: median credit-to-GDP 15% vs 45% in countries where high NPLs persist
 - Eg Bangladesh in the 2000s
- A credit boom is a theoretically possible but empirically improbable solution to most of today's instances of high NPLs

A two-step approach

- NPL policies affect NPL levels [look at probability and magnitude of reduction]
- Reductions in NPLs affect economic outcomes by removing the burden from the balance sheets of banks and corporates, boosting confidence



Link between NPL policies and sharp drops in NPLs + their magnitudes

$$P(SRD_{c,t} = 1) = \Phi(\beta_0 + \gamma Policy_{c,t} + \lambda X_{c,t} + \varepsilon_{c,t}) \quad (1)$$

$$SR_{c,t} | [SRD_{c,t} = 1] = \beta_1 + \mu Policy_{c,t} + \delta X_{c,t} + \nu_{c,t} \quad (2)$$

- 1st stage: likelihood of a sharp drop in NPL ratio ~ policy dummies, controls
 - Policy dummy = 1 if a given policy was in place during the preceding 3 years
 - Sample is restricted to instances of NPL ratio $a > 7\%$
- 2nd stage: Magnitude of a sharp drop conditional on a sharp drop
- Generalised linear model, framework of Belotti et al. (2015)
 - Γ distribution of the size of the overall reduction in NPLs conditional on achieving a sharp reduction and an identity link function
 - Two-part model since NPL reductions are observed, but we are also interested in when we observe sharp drop “events”

AMCs significantly increase likelihood/magnitude of a sharp drop

Macroprudential measures insignificant – designed to work as preventive measures rather than ex post

Classification / provisioning changes also insignificant (now shown)

Insolvency resolution (small sample): build-up of NPLs less likely, but impact on sharp drops may also be negative

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable</i>	Sharp drop in NPLs (dummy)			Drop in NPLs, % points		
	1st stage probit			2nd stage GLM		
NPL, initial level	-0.0568*** (0.00476)	-0.0506*** (0.00501)	-0.0813*** (0.00875)	0.161*** (0.0541)	0.166*** (0.0612)	0.115 (0.0989)
Asset management company	0.482*** (0.0947)	0.472*** (0.101)	0.626*** (0.162)	4.749*** (1.018)	3.420*** (1.059)	2.786* (1.495)
Public bailout funds	-0.228 (0.140)	-0.222 (0.153)	-0.210 (0.247)	3.179 (1.991)	3.573 (2.239)	4.612 (3.033)
Macroprudential tightening	0.114 (0.186)	0.124 (0.201)	-0.329 (0.259)	-2.491 (1.691)	-4.159** (1.737)	-2.936 (2.309)
GDP per capita, at PPP, log	-0.0835*** (0.0319)	-0.0925** (0.0472)	0.0957 (0.0676)	-2.659*** (0.298)	-1.397** (0.542)	-2.018*** (0.777)
GDP per capita growth, %	6.381*** (0.794)	8.742*** (1.049)	9.008*** (1.472)	10.71 (6.727)	19.04 (11.66)	49.64*** (15.45)
Inflation, %		0.0370 (0.103)	3.958*** (1.121)		7.391 (7.018)	14.28 (14.33)
Advanced economy		0.0145 (0.126)	-0.0878 (0.209)		-4.009*** (1.415)	3.358 (2.265)
Insolvency resolution index			-0.00736** (0.00367)			-0.159*** (0.0333)
Observations	1472	1248	645	597	503	277
Pseudo R ²	0.152	0.152	0.238			

AMCs and bailouts are complementary

Looking at NPL episode as a unit of observation

AMC without bailout is only $\approx 40\%$ as effective

Increase likelihood of achieving a sharp drop by around 26 percentage points

Bailouts on their own are not significant

	(1)	(2)	(3)	(4)
<i>Dependent variable</i>	<i>Sharp drop dummy</i>		<i>Change in NPLs over episode</i>	
Model	<i>Probit</i>	<i>Probit</i>	<i>OLS</i>	<i>OLS</i>
NPLs,	-0.0451***	-0.0511***	0.738***	0.761***
initial level	-0.00834	-0.0081	-0.0636	-0.0588
Asset management company, only	0.350*	0.353*	-4.801**	-4.843**
Public bailout funds, only	0.25	0.203	0.576	-0.139
AMC and bailout	-0.403	-0.334	-4.258	-3.509
	0.688***	0.642***	-7.124**	-6.987***
	-0.254	-0.24	-2.821	-2.595
GDP per capita at PPP, log	-0.00484	-0.000814	0.0958	0.084
GDP per capita growth	-0.00682	-0.00561	-0.0737	-0.0599
	3.803**	3.947***	-8.168	-11.39
	-1.669	-1.392	-11.6	-10.32
Inflation	-0.0986		0.337	
	-0.141		-1.081	
Advanced economy	-0.458*	-0.432*	3.267	2.865
	-0.248	-0.225	-2.703	-2.399
Observations	358	425	358	425
Pseudo R ² / Adj. R ²	0.123	0.130	0.280	0.292

Exploit the fact that many NPL reduction episodes start with a sharp drop in NPL ratio

- More than $\frac{3}{4}$ of NPL reduction episodes feature a sharp drop in the ratio towards the start of the episode (a drop of 5pp+ occurs within a single year or 10pp+ within 2 years)
- Only in 6 cases a steep drop is seen towards the middle of an episode
- Robustness checks with 7pp sharp drops

Propensity score matching to create plausible counterfactuals $y_{0i} \mid SD_i = 1$

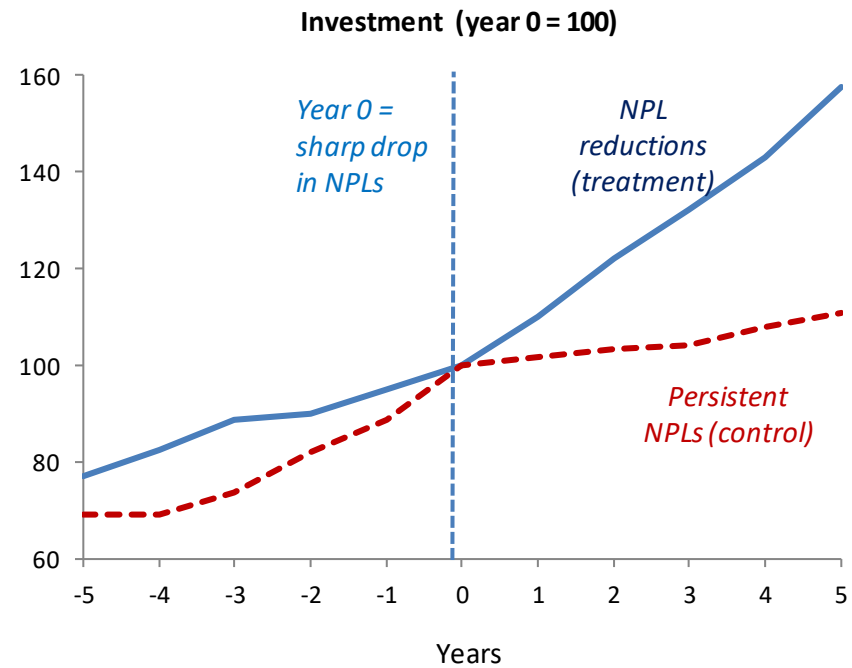
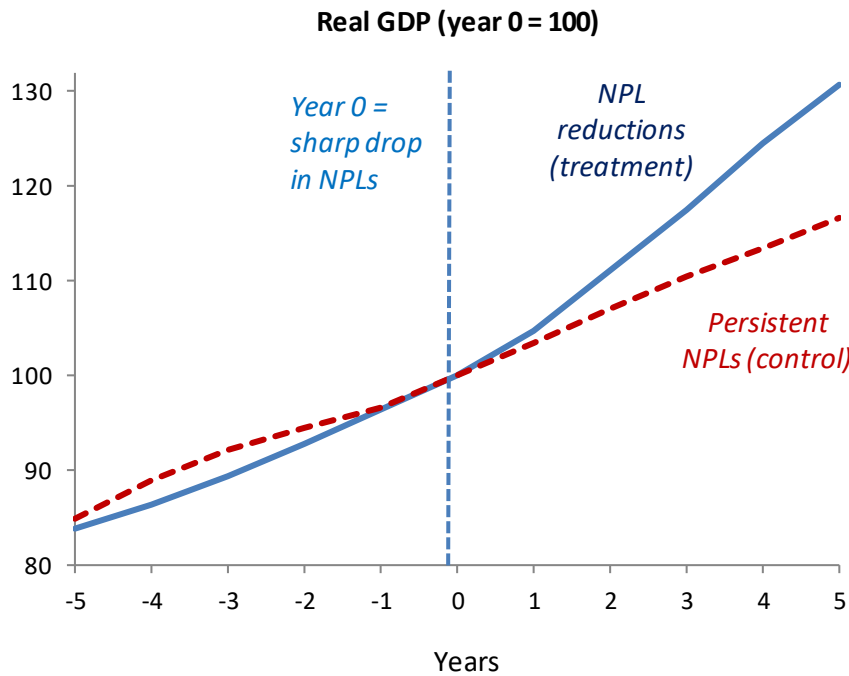
$$ATT = E[y_{1i} - y_{0i} \mid SD_i = 1]$$

$$E[y_{1i} - y_{0i} \mid SD_i = 1] = E[E(y_{1i} \mid X_i, SD_i = 1) - (y_{0i} \mid X_i, SD_i = 0) \mid SD_i = 1]$$

- Treatment: episodes (i) of sharp drops in NPL ($SD_i = 1$); episodes of high and persistent NPLs as controls ($SD_i = 0$)
- Matching on covariates X
 - GDP growth during the year of steep drop (year zero) [and year -1];
 - Inflation
 - GDP per capita
 - Debt-to-GDP
 - [NPL ratio]
 - [Credit-to-GDP]
 - [Unemployment, investment...]
- Kernel matching with common support (Rosenbaum and Rubin, 1983)
- Economic outcomes (y_i):
 - Growth of GDP per capita, investment, consumption, exports; unemployment rate

Significantly higher growth, with differential peaking in years 2-4, supported by rebounding investment

- Output level 12%+ higher by the end of year 5



**NPL reductions yield sizable gains:
extra growth of 1.5 pp+ per annum, peaking in years 2-4**

	Year 1	Year 2	Year 3	Year 4	Year 5
	ATT	ATT	ATT	ATT	ATT
GDP	1.5494 **	2.2533 ***	2.3302 ***	2.5816 ***	1.9256 ***
growth	<i>0.6628</i>	<i>0.6322</i>	<i>0.5644</i>	<i>0.5576</i>	<i>0.5362</i>
Investment	5.8939 **	7.2393 **	8.3875 ***	3.2911	5.0874 **
growth	<i>2.9136</i>	<i>3.5613</i>	<i>2.3094</i>	<i>3.0110</i>	<i>2.4332</i>
Consumption	3.4227 **	2.5834 ***	2.8758 ***	3.8572 ***	3.2166 ***
growth	<i>1.3575</i>	<i>0.9329</i>	<i>0.9809</i>	<i>0.9979</i>	<i>1.1195</i>
Export	0.2252	1.9826	4.3524 **	0.7069	1.6161
growth	<i>2.1521</i>	<i>1.8629</i>	<i>1.9067</i>	<i>1.9040</i>	<i>2.1541</i>
Unemployment	-2.7412 **	-2.6630 **	-2.4264 **	-2.1411 **	-2.0667 **
rate	<i>1.1056</i>	<i>1.1095</i>	<i>1.0794</i>	<i>1.0632</i>	<i>1.0418</i>
Controls	99	102	108	114	119
Treated	117	116	110	108	107

Example: Philippines

- Years of high and persistent NPLs:
 - Following the 1997 Asian crisis, NPL in the Philippines jumped to 12.4% in 1998 and further peaked at 27.7% in 2001
- Policy intervention: AMC supported by bailout funds and other measures:
 - Special Asset Management Companies Law (2002) created various (tax) incentives for private AMCs, limited a bank's ownership to 5% of AMCs that purchases assets from it [Fung et al., 2004] thus prompting a genuine market solution; Privatisation and Management Office established in 2001
 - Financial sector recapitalisation funds estimated at 13.2% of GDP [Laeven and Valencia, 2012]
- Sharp drop in NPL ratio and overall NPL reduction of 22pp:
 - NPL dropped to 14.6 percent at end-2002 (thus constituting an initial sharp drop) and eventually declined further to 5.6 per cent in 2007
- Economic growth picked up:
 - 2.5% in 1998-2001 → 3.6% in 2002 (year of sharp drop) → 5.7% in 2003-07 (5 subsequent years)

The results are robust to the choice of classification of episodes, matching, filtering of episodes...

- Focus on large falls in the NPL ratio (15pp +, minimise the possibility that a particular reduction period is the result of coincidence rather than effort)
- Stricter definition of a sharp drop (eg 7pp in a year / 10pp in 2 years)
- Also various permutations of matching variables (investment, private sector credit, unemployment...)
- Various types of matching
- Kick-out episodes where credit growth made an important contribution at the start

Robustness checks

	(1) <i>Excl credit- driven</i>	(2) <i>Excl more credit-driven</i>	(3) <i>Extended sets of matching variables</i>	(4)	(5) <i>Using 15% for high NPLs</i>
GDP	2.6890 ***	2.3643 ***	2.5527 ***	2.8142 ***	2.1194 ***
growth	<i>0.5391</i>	<i>0.4710</i>	<i>0.7278</i>	<i>0.5362</i>	<i>0.5617</i>
Investment	8.0922 ***	7.9085 ***	8.5992 ***	6.5318 ***	8.4458 ***
growth	<i>2.5205</i>	<i>2.1929</i>	<i>2.8923</i>	<i>1.3078</i>	<i>2.7883</i>
Consumption	2.5956 ***	2.4508 ***	1.3846 **	2.6520 ***	2.4577 ***
growth	<i>0.5744</i>	<i>0.5384</i>	<i>0.6910</i>	<i>0.5253</i>	<i>0.7129</i>
Export	2.2868	2.5190 **	3.8848 **	1.4000	2.1280
growth	<i>1.5017</i>	<i>1.2462</i>	<i>1.8837</i>	<i>1.4066</i>	<i>1.5641</i>
Unemployment	-2.6139 **	-2.6898 **	1.3037	-2.5168 *	-1.7965
rate	<i>1.2295</i>	<i>1.1772</i>	<i>1.9076</i>	<i>1.3257</i>	<i>1.4174</i>
Controls	88	95	85	88	88
Treated	76	41	69	67	91

Robustness checks: 7pp sharp drops

	Year 1	Year 2	Year 3	Year 4	Year 5
	ATT	ATT	ATT	ATT	ATT
GDP growth	1.3671 ** <i>0.6811</i>	2.5075 *** <i>0.6527</i>	2.4953 *** <i>0.6977</i>	3.2112 *** <i>0.5934</i>	2.3796 *** <i>0.5906</i>
Investment growth	8.6906 ** <i>3.5837</i>	8.9437 ** <i>4.3375</i>	7.2978 *** <i>2.6941</i>	4.8172 <i>3.4223</i>	7.3113 *** <i>2.6407</i>
Consumption growth	2.6888 ** <i>1.0553</i>	2.6143 ** <i>1.076</i>	2.5038 ** <i>1.0524</i>	4.1829 *** <i>1.0891</i>	3.3704 *** <i>1.1416</i>
Export growth	0.0844 <i>2.3896</i>	3.7294 * <i>2.1428</i>	3.5284 <i>2.2938</i>	1.3223 <i>2.1846</i>	3.0499 <i>2.0739</i>
Unemployment rate	-3.0567 ** <i>1.1435</i>	-3.0135 ** <i>1.1569</i>	-2.9464 ** <i>1.1379</i>	-2.4682 ** <i>1.1153</i>	-2.1289 ** <i>1.0818</i>
Controls	99	102	108	114	119
Treated	90	89	84	83	82

Additional robustness checks (NPL levels trajectory)

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>
	<i>ATT</i>	<i>ATT</i>	<i>ATT</i>	<i>ATT</i>	<i>ATT</i>
GDP	0.8181	2.8359 *	1.8214	2.7444 **	2.2990 **
growth	2.1436	1.5789	1.1632	1.1360	1.0359
Investment	9.9246	9.6467	7.6585 *	9.5592 *	7.3657
growth	6.1539	6.3581	4.3182	5.4441	6.3507
Consumption	2.1979	0.5019	0.7160	3.0665	4.6817 **
growth	2.9474	2.1070	2.3413	2.1868	2.2552
Export	1.9334	4.3343	2.9143	0.5653	6.6164 *
growth	5.2335	4.3129	3.7309	3.8021	3.9986
Unemployment	-1.7139	-1.9754	-2.0094	-1.4563	-0.4956
rate	2.9982	2.6453	2.5094	2.3091	2.1716
Controls	101	104	110	117	123
Treated	92	86	77	74	75

Discussion: If returns to reducing NPLs are high, why are NPL policies not more common?

- Effective policies (eg AMC + bailout) come at a cost (9%+ of GDP although some may be recovered)
- Infinite-horizon NPV of future GDP gains is 40%+ of today's GDP assuming 8% discount rate and 20% of output gain being permanent
 - Maybe lower with other assumptions but NPV of extra taxes covers costs
- Within a horizon of ≤ 4 years – typical electoral cycle – the balance looks different (NPV 4-9% of GDP) hence political attractiveness may be limited
- Administrative capacity may be a binding constraint in other cases as effective policies involve well-coordinated packages of public funds + market-based solutions

Concluding remarks: Some good news – and bad

- A new dataset on episodes of high NPLs world-wide and policies deployed to address high NPLs – to establish stylized facts and look at the impact of NPL reductions
- Good news:
 - Policy packages can be effective in terms of reducing the NPLs
 - Lower NPL burden is, in turn, associated with significant economic benefits in the medium term
 - Past episodes provide valuable insights into packages that work
- The not-so-good news:
 - Anatomy of the past NPL episodes
 - A successful resolution may be particularly challenging when the malaise is more chronic than acute, debt levels are high, the use of public funds for recapitalisation is restricted and political horizons are short