Makroekonomski učinci sistemskog stresa: pristup pomičnog indeksa prelijevanja

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SADRŽAJ

1. UVODNO

- Motivacija:
  - značaj sistemskog stresa (stvarni događaji)
  - prepoznato u literaturi (teorija i empirija, Borio i Lowe 2002, Borio i Drehmann 2009, Bloom 2009)
  - no, modeli bez mjera stresa i/ili makroprudencijalne politike
  - želimo korak bliže shvaćanju interakcija
- Cilj: istražiti interakciju sistemskog stresa i odabranih varijabli u Njemačkoj, pomoću indeksa prelijevanja šokova (Diebold i Yilmaz, 2012) u okviru VAR modela
- Doprinosi: nekoliko varijabli, dinamička analiza, detaljnija
- Zašto Njemačka?
  - Alter i Beyer (ECB, 2013): Njemačke, talijanske i austrijske banke najveći „davatelji" šokova (promjene CDS spreadova) u euro području (2009-2012)
  - Gross i Siklos (ESRB, 2018): Španjolska, Francuska, Njemačka i Švicarska su najveći „davatelji" (*emitters*) financijskog rizika (152 europskih CDS-ova, 2006-2017)
  - MMF (2016): Njemačka, Francuska, UK, SAD najveći „davatelji" šokova kapitalnih gubitaka bankovnog sustava
  - moguća usporedba s vezanim istraživanjima

2. VEZANA LITERATURA - ukratko

- Motivacija istraživanja nakon kriza; problematika mjerenja stresa
- Prvo radovi o načinu definiranja i mjerenja sistemskog stresa:
  - obuhvat (tržište novca, obveznica, dionica, FX, financijski posrednici); odražavanje transakcija; dostupno u realnom vremenu...
  - Hakkio i Keeton (2009) Kansas City Financial Stress Index
  - Holló i ostali (2012) **Composite Indicator of Systemic Stress**
  - Van Roye (2014) Financial Stress Market Indicator
- Potom istraživanja interakcije sistemskog stresa i ostatka ekonomije:
  - Li i St-Amant (2010): *threshold* VAR, za učinke stresa na monetarnu politiku, Kanada, inflacija i realna aktivnost jače reagiraju na kontrakcijsku MP (asimetričnost)
  - Van Roye (2014): *threshold* VAR, Njemačka, učinci stresa na IIP, inflaciju i k stopu, asimetričnost reakcija u ovisnosti o razdoblju višeg/nižeg stresa
  - Hartmann i ostali (2015): *regime switching* VAR, učinak stresa na IIP, k stopu, rast kreditiranja pvt sektoru, asimetričnost rezultata (samo u stresnijem razdoblju značajni rezultati)
  - Kremer (2016): VAR, Euro-zona, učinci stresa na BDP, inflaciju, k stopu, stres značajno utječe na sve varijable u modelu, no sam autor kritizira obični model
- „Jazevi" literature (*literature gaps*): dinamika, detaljnije analize prelijevanja šokova, obuhvat varijabli

3. METODOLOGIJA

- za ideju: VAR(1) za $N = 2$ varijable: $\boldsymbol{x_t} = \boldsymbol{A x_{t-1}} + \boldsymbol{e_t}$, ako je $\boldsymbol{x_t}$ kovarijančno stacionaran, MA reprezentacija: $\boldsymbol{x_t} = \boldsymbol{\theta e_t}$, $\boldsymbol{\theta} = (\boldsymbol{I} - \boldsymbol{A}L)^{-1}$, i uz pretpostavku Cholesky dekompozicije prikaz: $\boldsymbol{x_t} = \boldsymbol{A}(L)\boldsymbol{u}_t$, $\boldsymbol{A}(L) = \boldsymbol{\theta}(L)\boldsymbol{Q}_t^{-1}$, $\boldsymbol{u}_t = \boldsymbol{Q}_t \boldsymbol{e_t}$
- prognoza u t+1: $\boldsymbol{x_{t+1,f}} = \boldsymbol{A x_t}$ **;** greška prognoze: $\boldsymbol{x_{t+1,f}} - \boldsymbol{x_{t+1}} = \boldsymbol{A u}_{t+1}$ **;**
- varijanca prognoze: za x_1 ... $a_{11}^2 + a_{12}^2$, za x_2 ... $a_{21}^2 + a_{22}^2$ i iz toga dekompozicija varijanci:

$$\text{za } x_1 \text{ ... } \frac{a_{11}^2}{a_{11}^2 + a_{12}^2} = \tilde{a}_{11} \text{ i } \frac{a_{12}^2}{a_{11}^2 + a_{12}^2} = \tilde{a}_{12} \text{ i slično za } x_2 \text{ ... } \frac{a_{21}^2}{a_{21}^2 + a_{22}^2} = \tilde{a}_{12} \text{ i } \frac{a_{22}^2}{a_{21}^2 + a_{22}^2} = \tilde{a}_{22}$$

- indeks ukupnog prelijevanja šokova = $\tilde{a}_{12} + \tilde{a}_{12}$
- pomični prozori

- teorija i primjene u velikom uzletu: Diebold i Yilmaz (2009, 2012, 2015), Bostanci i Yilmaz (2020), Uluceviz i Yilmaz (2020), Bilgin i Yilmaz (2018), Antonakakis et al. (2016), Arčabić i Škrinjarić (2021a, 2021b)

4. REZULTATI

- Opis varijabli: (mjesečno, siječanj 1999. – prosinac 2020.), slučaj Njemačke

TABLE 1

Variables description

Abbreviation	Full name
DIIP	Year-on-year growth rate of index of industrial production
DHICP	Year-on-year growth rate of harmonized index of consumer prices
DIRATE	Year-on-year change of the 3-month Euribor rate
DLN	Year-on-year growth rate of nominal bank loans to the private sector
CISS	German Composite Indicator of Systemic Stress
SQ_CISS	Square root of CISS
DGDP	Year-on-year growth rate of gross domestic product

Source: Eurostat (2021), DBE (2021), ECB (2021).

TABLE 2

Spillover table, full sample, in percent

Variable	DIIP	DHICP	DIRATE	DLN	CISS	From	T_from
DIIP	52.84	5.05	16.77	1.89	23.46	11.79	47.17
DHICP	21.15	63.80	2.29	0.66	12.09	9.05	36.19
DIRATE	12.35	1.27	56.89	1.17	28.32	10.77	43.11
DLN	0.07	1.38	9.61	84.55	4.38	3.86	15.44
CISS	3.03	4.25	2.21	0.45	90.06	2.49	9.94
To	9.15	2.99	7.72	1.04	17.06	-	-
T_to	36.60	11.95	30.88	4.17	68.25	-	37.96

Source: Author's calculation.

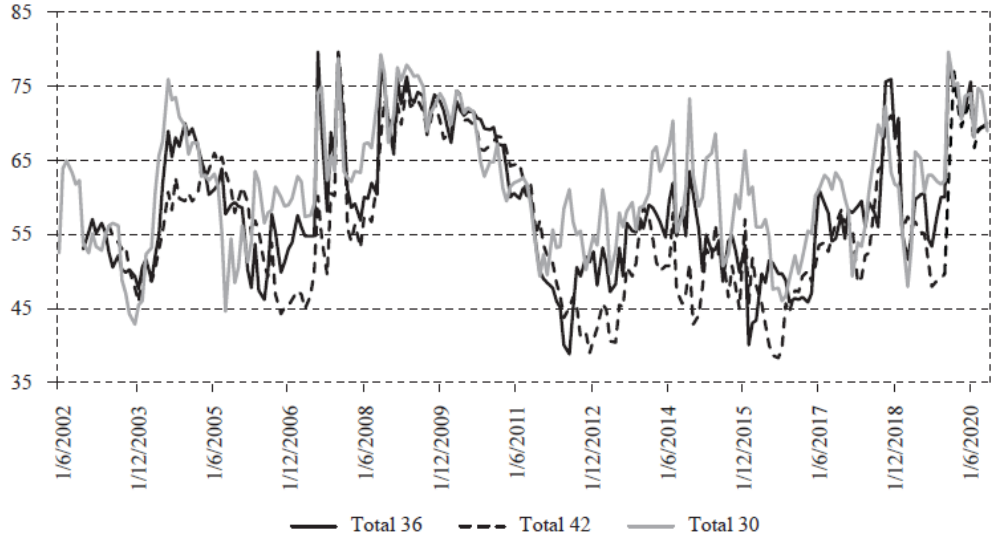
- za *h* = 12 mjeseci prognoze unaprijed, cijeli uzorak (statička analiza)

- CISS kao davatelj šokova, poredak:
  - kamatna stopa (očekivano s obzirom na reakcije monetarne politike na zbivanja obuhvaćena u CISS varijabli) i IIP (očekivano, s obzirom na rastuću literaturu o GaR)
  - inflacija, krediti – slaba reakcija (statička analiza, u skladu s ne-reagiranjem u Hartmann i ostali (2013))

- CISS kao primatelj šokova: inflacija, IIP, kamatna stopa, krediti – vrlo malo što je u skladu s literaturom da je teško predviđati financijski stres

FIGURE 1

Total spillover index, h = 12, rolling windows 30, 36 and 42 months



Source: Author's calculation.

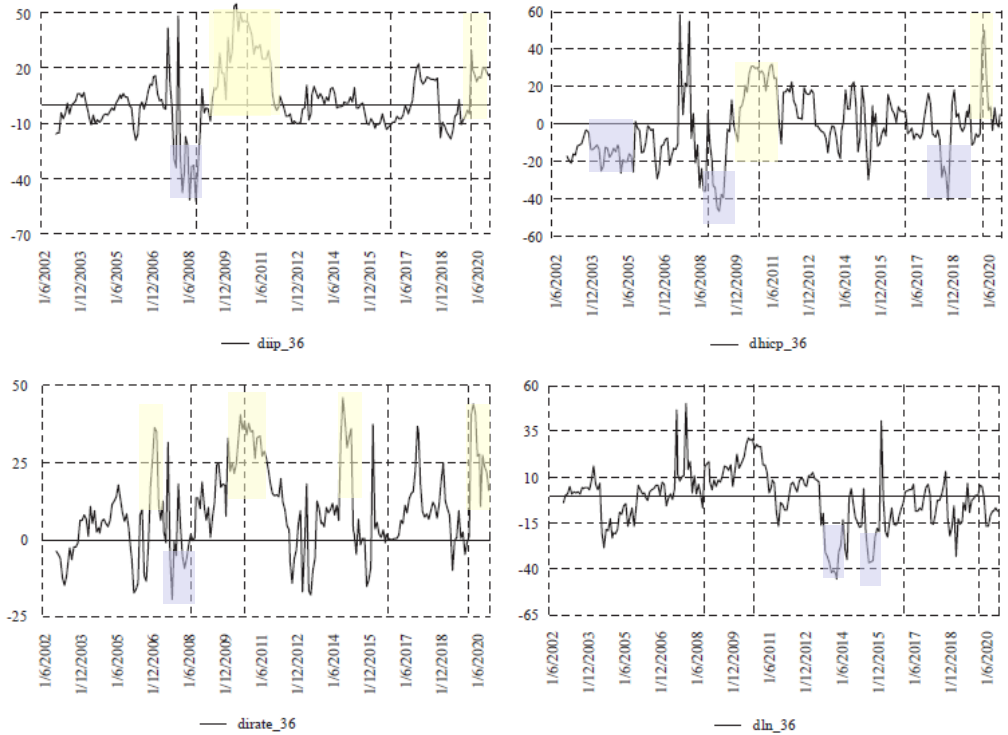
Povećavanje prelijevanja šokova:

2003: Dotcom bubble i Worldcom bankrot
2007/2008: GFC
2018: promjene očekivanja investitora zbog povećanja k. stopa FED-a
2020: COVID-19 (očekivanja bila da vrlo kratko: Boivin i dr. (2020), zbog brze reakcije (Ehnts i Paetz, 2021), banke dio rješenja (Giese i Haldane, 2020)

Smanjenja:
2011-2012: ECB najava o kupovini državnih obveznica, Weber dao ostavku pa se nastavila politika otkupa, dogovor da EFSF (European Financial Stability Facility) i ESM (European Stability Mechanism) izravno interveniraju

FIGURE 2

Net pair-wise spillover indices between each variable and CISS, h =12, rolling windows 36 months



Note: Dashed lines indicate dates from left to right: Global financial crisis, Euro crisis, Brexit referendum vote and COVID-19 crisis.

Source: Author's calculation.

- Praćenje indeksa za svaki par varijabli

DIIP:

- odsustvo u mirnijim razdobljima (Hakkio i Keeton, 2009; Hubrich i Tetlow, 2014)
- suprotno u stresnijem razdoblju (u skladu s GaR literaturom)

DHICP:

- CISS prima šokove prije GFC (Frankel, 2012)

DIRATE:

- češće primatelj šokova (u skladu s konvencionalnim pogledom na mon. pol., Bernanke i Gertler, 2001; Ben i ostali, 2010)
- uzima u obzir ne samo Y i π, nego i očekivanja u CISS-u

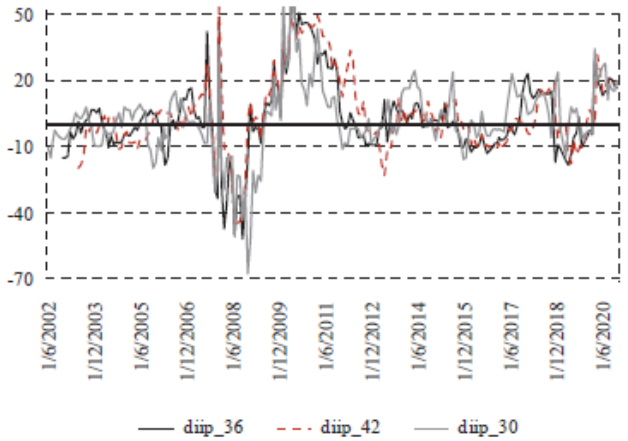
DLN:

- najstabilniji indeks, usporenija reakcija (Ivashina i Scharfstein, 2010; Harmann i ostali, 2013 – draw downs)

Robusnost rezultata

- Promjena duljine pomičnog prozora
- Promjena duljine horizonta predviđanja iz procjena
- BDP umjesto IIP

Net pair-wise spillover indices between each variable and CISS, h =12, rolling windows 30, 36 and 42months



Source: Author's calculation.

5. ZAKLJUČAK

- Motivacija (nedostatak teorijskih i empirijskih istraživanja; razumijevanje interakcije)
  - 12.4.2022. Laeven et al.: Monetary and macroprudential policies: trade-offs and interactions: „*New state-of-the-art empirical and conceptual frameworks need to be developed to assess in a timely manner wheter risk-taking is becoming excessive...”*
  - Navode radove iz 2021. i 2022.
  - 10.4.2022. Revelo i Levieuge: When Could Macroprudential and Monetary Policies Be in Conflict? „Further research could also focus on extending the analytical framework by inserting an endogenous risk-taking channel as an additional source of financial-side vulnerability caused by monetary policy.”
- Sumarno:
  - mirnija razdoblja: manja reakcija na stres, realna aktivnost većinom reagira na stres
- Ovakav pristup:
  - dinamika interakcija
  - bogatije informacije u rezultatima
- Nedostaci: dulje razdoblje, druge varijable
- Budućnost: povezati s drugim pristupima (Suarez 2021, mapru funkcija korisnosti)

Hvala na pažnji!

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