Domestic and Foreign Monetary Policy Transmission in the WAEMU

Giovanni Ricco[1,2] Emanuele Savini[2] Elena Scola Gagliardi[3] Anshumaan Tuteja[4]

[1] École Polytechnique, and OFCE-SciencesPo
[2]University of Warwick
[2]Università di Roma 'La Sapienza'
[3]Ashoka University

Banque Centrale des États de l'Afrique de l'Ouest

Dakar, Senegal

25th August 2025

MP shocks in the WAEMU

The WAEMU has independent monetary policy (in the short run):

- Fixed exchange rate with the euro
- Price stability as a primary target (2% inflation)
- (Some capital controls, mainly on outflows)

$\Longrightarrow$ The BCEAO can set the policy rates independently from the EA

$\Longrightarrow$ . . . as long as it maintains healthily reserves

$\Longrightarrow$ Degree of insulation from external shocks

MP shocks in the WAEMU

The WAEMU has independent monetary policy (in the short run):

- Fixed exchange rate with the euro
- Price stability as a primary target (2% inflation)
- (Some capital controls, mainly on outflows)

$\Longrightarrow$ The BCEAO can set the policy rates independently from the EA

$\Longrightarrow$ ... as long as it maintains healthily reserves

$\Longrightarrow$ Degree of insulation from external shocks

This work:

1. How does domestic monetary policy transmit?
2. How does the ECB's MP affects the WEAMU and through which channels?
   (Dilemma vs Trilemma debate – Rey 2013, Obstfeld 2015, Kalemli-Özcan, 2019, ...)
   - Demand-changing channel (changes in demand from the euro area)
   - Expenditure switching channel (invoicing in euro)
   - Financial channel (limited?!)
3. How does the Fed's MP affects the WAEMU

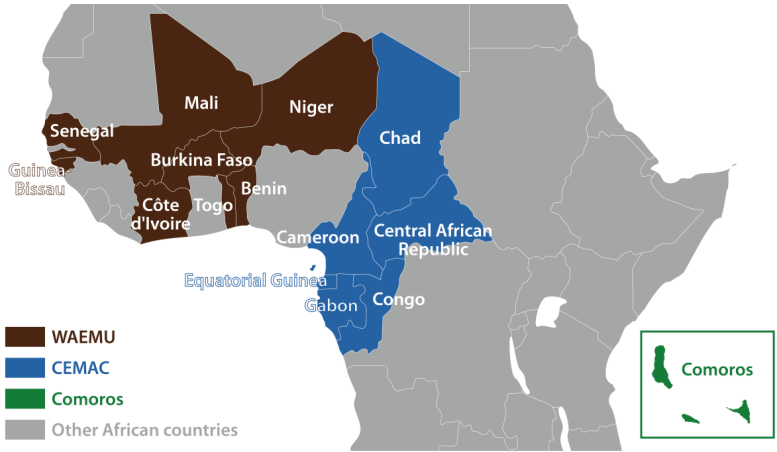
The empirical approach

- Bayesian medium-sized VAR models
  - Domestic VAR with aggregate WAEMU data
  - Bilateral EA-WAEMU & US-WAEMU BVARs with asymmetric transmission
  - Bilateral EA-WA Country & US-WA Country BVARs with asymmetric transmission (and aggregation)
- High-frequency IVs for conventional MP and QE in the euro area (Ricco, Savini and Tuteja, 2024)
- High-frequency IV for US MP shocks (Miranda-Agrippino and Ricco, 2021)

  $\Longrightarrow$ Identify and study the transmission of domestic and international MP shocks

The West African Economic and Monetary Union

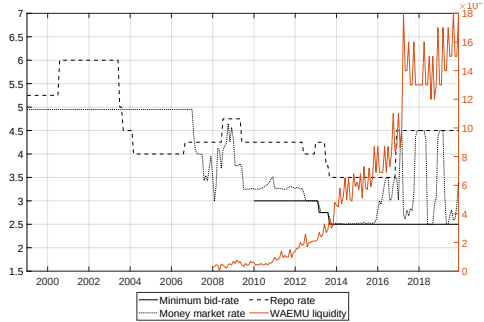
The West African Economic and Monetary Union

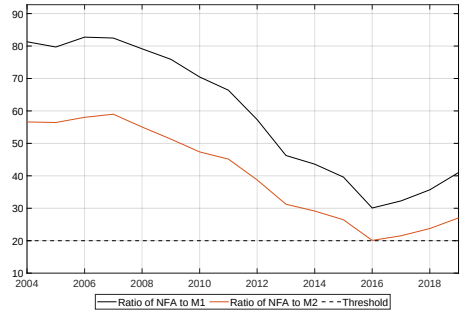


- Long standing monetary union, grouping 8 West African economies
- The BCEAO is the common central bank issuing the CFA franc
- CFA franc peg and convertibility fully guaranteed by the central bank & French Treasury

BCEAO monetary framework

- Inflation target of 2% ([1%-3%] band) over a 2-year period
- Fixed exchange rate with euro
- Capital controls on most capital transactions with non-residents
- Three policy tools:
  - Minimum bid-rate
  - Marginal lending rate (repo rate)
  - Statutory non-remunerated reserves
- Foreign exchange (FX) reserve coverage above 20%





WAEMU trade share to euro area

Table 1: *Trade share with euro area*

	Exports				Imports			
	2016	2017	2018	2019	2016	2017	2018	2019
Benin	5.8	3.9	2.4	2.7	25.4	21.3	19.2	20.4
Burkina Faso	5.5	4.4	5.4	4.2	22.7	26.7	19.7	22.7
Côte d'Ivoire	36.2	37.1	32.5	35.0	28.6	34.0	26.0	24.3
Guinea-Bissau	1.7	0.0	1.0	26.8	51.1	56.4	60.3	55.7
Mali	2.1	2.0	3.4	2.5	20.8	21.1	21.4	18.5
Niger	32.6	12.0	14.5	12.0	35.2	21.2	27.7	23.2
Senegal	12.0	12.7	12.9	10.9	35.8	32.6	29.5	39.9
Togo	7.2	8.1	8.6	8.5	26.3	25.2	22.2	23.9

Source: World Integrated Trade Solution

▸ Top export partners of WAEMU ▸ Top import partners of WAEMU

Trade invoicing

Table 2: *Annual Trade Invoicing during 2016-19 (in %)*

	Exports	Imports
Euro	**75**	**72**
USD	8	11
Home	17	16
Total	100%	99%

Source: Boz et al. (2020).
Excludes invoicing in Ivory coast and Senegal

▸ EU countries' invoicing

Domestic Transmission of Monetary Policy

VAR model for domestic shocks

- VAR model with domestic variables

$$Y_t = C + A_1 Y_{t-1} + \ldots + A_{12} Y_{t-12} + e_t$$

- Estimation sample: 1999:01-2019:12
- Bayesian VAR(12) in log levels
- Standard macroeconomic prior (Litterman, 1986)
- Recursive identification of MP shocks
- Dynamic responses of macro aggregate WAEMU variables

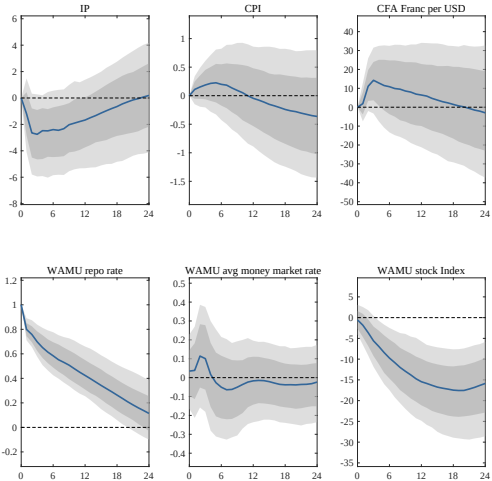
Data included in the VAR

Table 3: *Data sources for variables included in the VAR model*

Variable	Sample	EoM	Sources	Log	RW
WAEMU variables					
Industrial Production[1]	1999m1-2019m12		BCEAO	•	•
Consumer Price Index[1]	1999m12-2019m12		BCEAO	•	•
Exports[3]	1999m1-2019m12		IMF DOTS	•	•
Imports[3]	1999m1-2019m12		IMF DOTS	•	•
Repo rate	1999m1-2019m12	Y	BCEAO		
Avg money market rate	1999m1-2019m12	N	BCEAO		
Interbank market rate	2000m1-2019m12	N	BCEAO		
Loan rates	2005m1-2019m12	N	BCEAO		
Exchange rate[4]	1999m1-2019m12	Y	IMF IFS + BCEAO		•
Stock price	1999m1-2019m12	Y	Bloomberg & WSJ	•	•

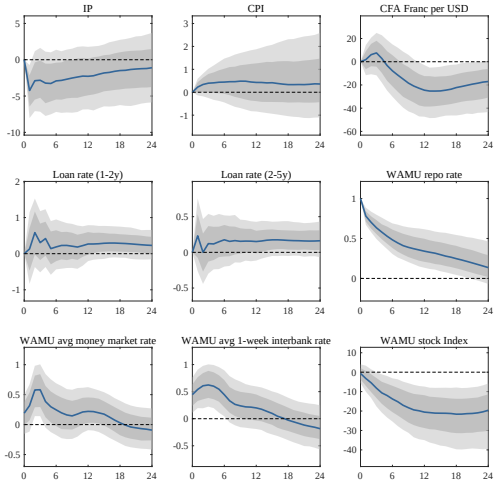
[1] Census X-12 method used for de-seasonalisation.
[2] An exponential smoothing is used for WEAMU trade data.
[3] Exchange rate data at daily frequency is available from BCEAO only starting Jan 2002. IFS is used to extend the sample.

Domestic monetary policy transmission in WAEMU



Median responses to a 1% point increase in the repo rate using a VAR for the period 1999-2019. Structural identification obtained using recursive order. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

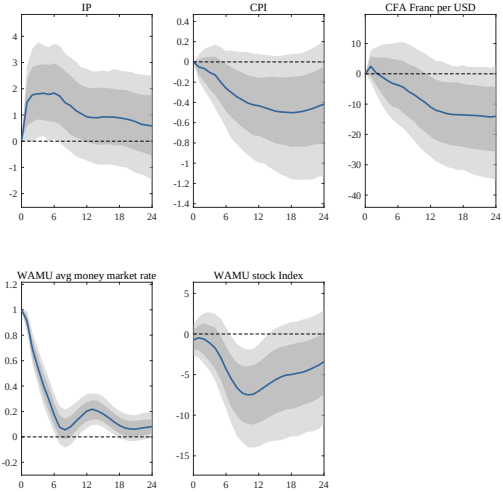
Domestic monetary policy transmission in WAEMU



Median responses to a 1% point increase in the repo rate using a VAR for the period 2005-2019. Structural identification obtained using recursive order. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Domestic monetary policy transmission in WAEMU

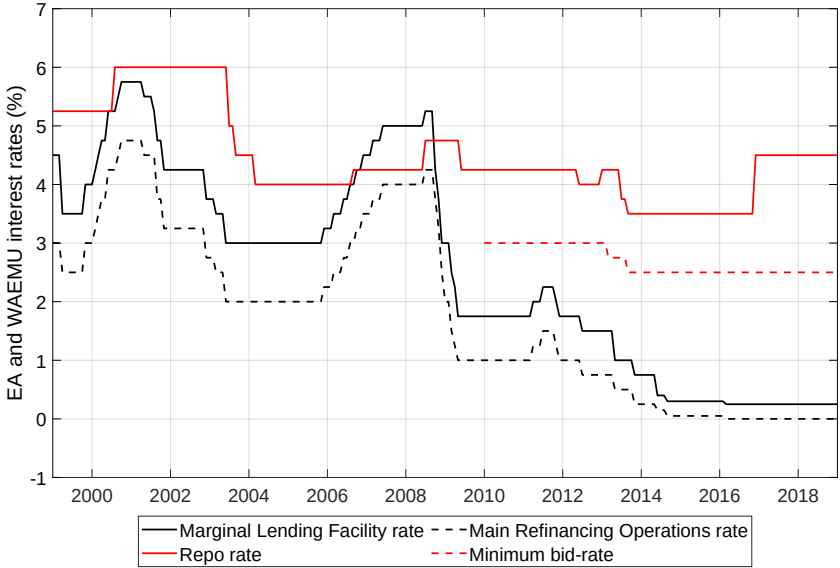
Shock to the Money Market Rate



Median responses to a 1% point increase in the repo rate using a VAR for the period 2005-2019. Structural identification obtained using recursive order. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Spillovers from Monetary Policy in the Euro Area

BCEAO's and ECB's monetary policy



A Bilateral VAR model for spillovers

- Bilateral EA-WAEMU VAR models

$$\mathbf{Y_t} = \mathbf{C} + \mathbf{A_1}\mathbf{Y_{t-1}} + \ldots + \mathbf{A_{12}}\mathbf{Y_{t-12}} + \mathbf{e_t}$$

where

$$\mathbf{Y_t} = \begin{bmatrix} Y_t^{EA} \\ Y_t^{WAEMU} \end{bmatrix} \qquad \mathbf{A_k} = \begin{bmatrix} A_k^{EA,EA} & 0 \\ A_k^{EA,WAEMU} & A_k^{WAEMU,WAEMU} \end{bmatrix}$$

- Estimation sample: 1999:01-2022:12
- Bayesian VAR(12) in log levels
- Asymmetric macro prior (Chan, 2022)
- External IV identification with information robust instruments
- IRFs:
  - Aggregate WAEMU variables or
  - Aggregation of country level variables into median economy response

Data included in the Bilateral EA-WAEMU VAR

Table 4: *Data sources for variables included in the VAR model*

Variable	Sample	EoM	Sources	Log	RW
EA variables					
Industrial Production[1]	1999m1-2019m12		Eurostat	•	•
GDP deflator	1999m1-2019m12		Jarocinski and Karadi (2020)	•	•
Nominal Effective Exchange Rate	1999m1-2019m12	Y	ECB SDW		•
OIS3M rate	1999m1-2019m12	Y	Eikon		
OIS10Y rate[2]	1999m1-2019m12	Y	Eikon		
EA10Y rate	1999m1-2019m12	Y	Eikon		
WAEMU variables					
...					
... as in the domestic VAR ...					
...					

[1] Census X-12 method used for de-seasonalisation.
[2] OIS10Y data available from Aug 2005. DE10Y used to extend the sample.
[3] An exponential smoothing is used for WEAMU trade data.
[4] Exchange rate data at daily frequency is available from BCEAO only starting Jan 2002. IFS is used to extend the sample.
[5] IIP data for Guinea-Bissau is available from Jan 2005.

Monetary policy surprises for the EA

Ricco, Savini, Tuteja (2024)

1. Financial assets price revisions in small windows around ECB's press release and press conference (Altavilla et al, 2019):
   - Risk-free rates (OIS) - 1M, 3M, 6M, 1Y, 2Y, 5Y, 10Y
   - Exchange rates - EURUSD, EURGBP, EURJPY
   - Sovereign spreads - 2Y, 5Y, 10Y
   - Stock market - STOXX50
2. Sum surprises from both windows to capture total effect of ECB decision

Monetary policy surprises for the EA

Ricco, Savini, Tuteja (2024)

1. Financial assets price revisions in small windows around ECB's press release and press conference (Altavilla et al, 2019):
   - Risk-free rates (OIS) - 1M, 3M, 6M, 1Y, 2Y, 5Y, 10Y
   - Exchange rates - EURUSD, EURGBP, EURJPY
   - Sovereign spreads - 2Y, 5Y, 10Y
   - Stock market - STOXX50
2. Sum surprises from both windows to capture total effect of ECB decision
3. Extract 4 principal components and rotate them to provide structural interpretation
   - **Conventional MP**: changes in short-term policy rate
   - **Forward guidance**: shift in market expectations over medium-term maturities
   - **Quantitative easing/tightening**: higher loading on long-term maturities
   - **Country risk factor**: positive loadings on sovereign spreads
4. Remove 'information' effects in a nonlinear setting

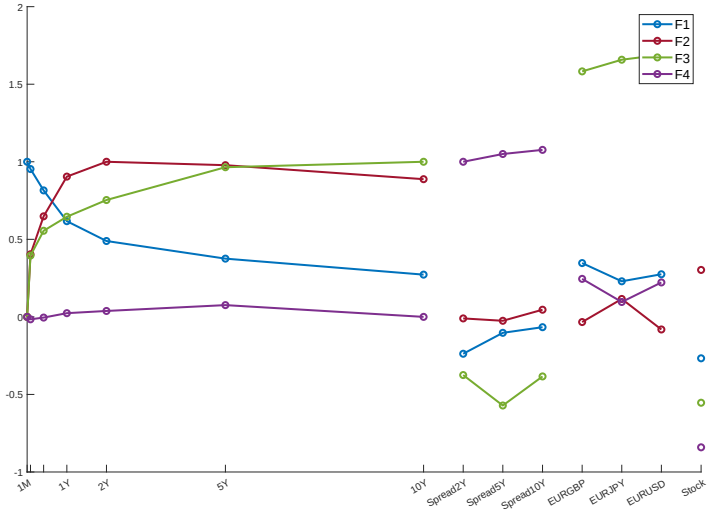
Monetary policy surprises for the EA

Ricco, Savini, Tuteja (2024)

1. Financial assets price revisions in small windows around ECB's press release and press conference (Altavilla et al, 2019):
   - Risk-free rates (OIS) - 1M, 3M, 6M, 1Y, 2Y, 5Y, 10Y
   - Exchange rates - EURUSD, EURGBP, EURJPY
   - Sovereign spreads - 2Y, 5Y, 10Y
   - Stock market - STOXX50
2. Sum surprises from both windows to capture total effect of ECB decision
3. Extract 4 principal components and rotate them to provide structural interpretation
   - **Conventional MP**: changes in short-term policy rate
   - **Forward guidance**: shift in market expectations over medium-term maturities
   - **Quantitative easing/tightening**: higher loading on long-term maturities
   - **Country risk factor**: positive loadings on sovereign spreads
4. Remove 'information' effects in a nonlinear setting

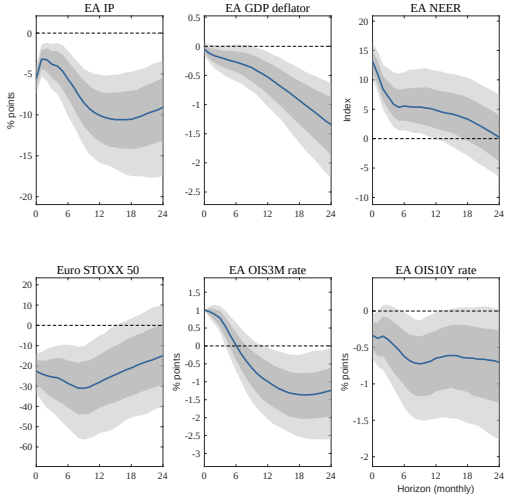
Monetary policy surprises for the EA

Ricco, Savini, Tuteja (2024)



Euro Area conventional monetary policy shock

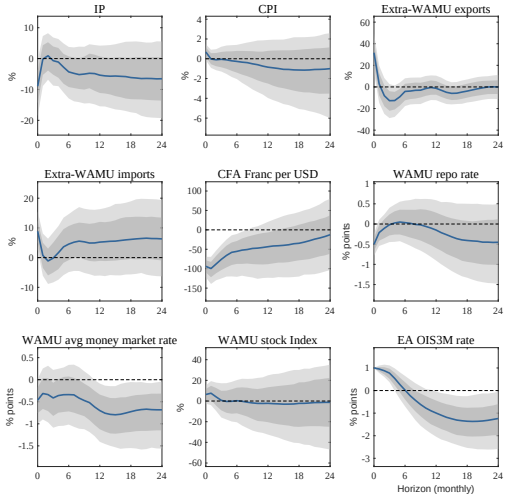
Euro area block with aggregated data



Median responses to a 1% point increase in EA 3 month OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Euro Area conventional monetary policy shock

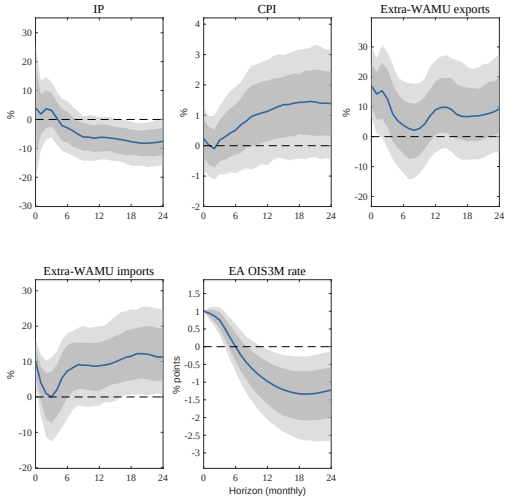
Spillovers with aggregated data



Median responses to a 1% point increase in EA 3 month OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Euro Area conventional monetary policy shock

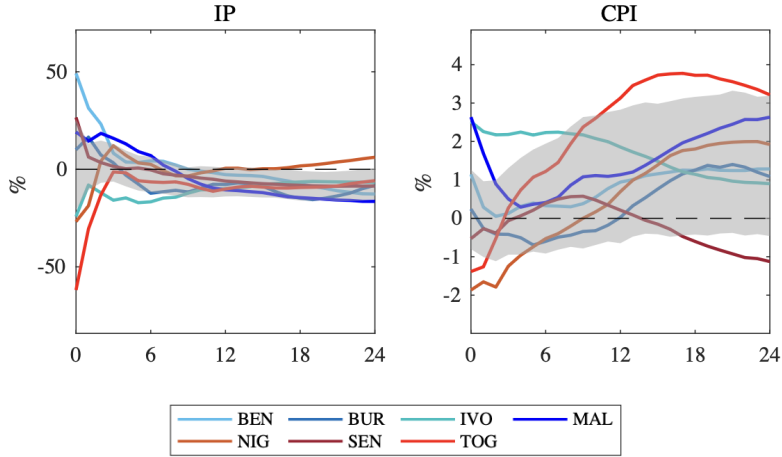
Median-median spillovers with country data



Median-median responses to a 1% point increase in EA 3 month OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Euro Area conventional monetary policy shock

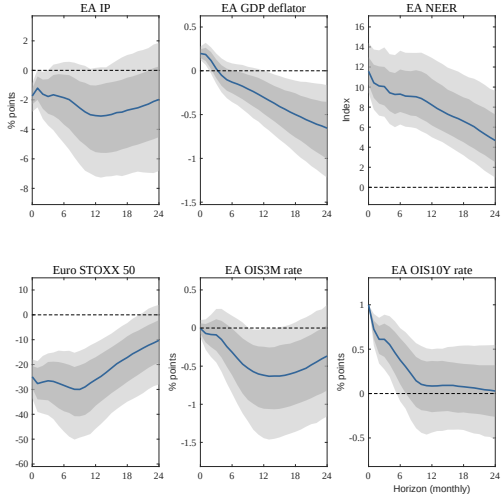
Heterogeneity at country level



Median-median responses to a 1% point increase in EA 3 month OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Euro Area QE shock

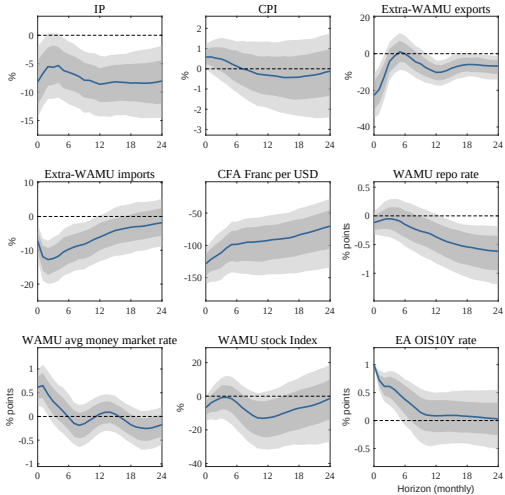
Euro area block with aggregated data



Median responses to a 1% point increase in EA 10 year OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Euro Area QE shock

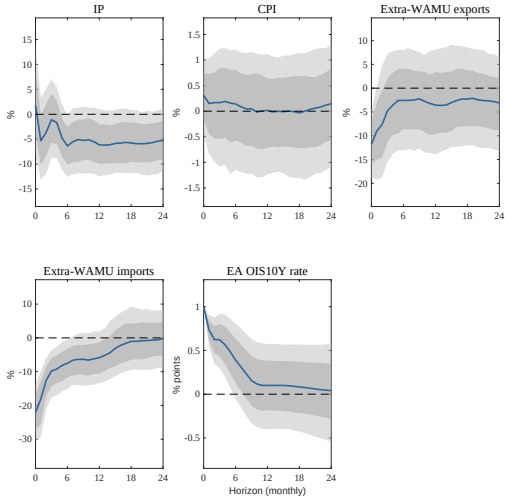
Spillovers with aggregated data



Median responses to a 1% point increase in EA 10 year OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Euro Area QE shock

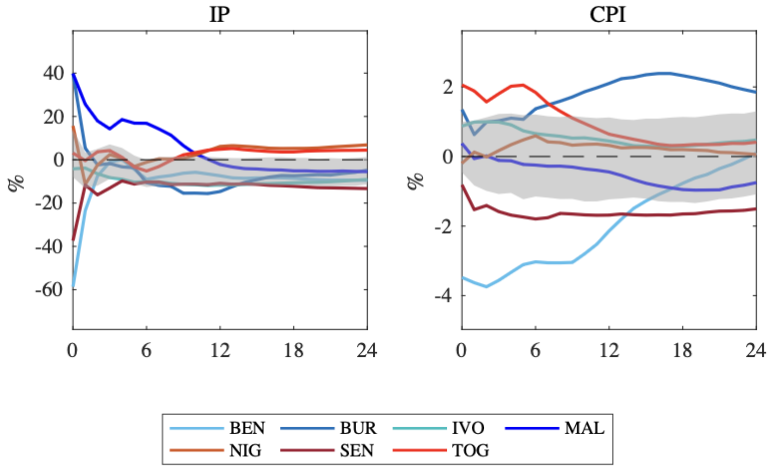
Median-median spillovers with country data



Median-median responses to a 1% point increase in EA 10 year OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Euro Area QE shock

Heterogeneity at country level



Median-median responses to a 1% point increase in EA 10 year OIS rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Spillovers from US monetary policy

A Bilateral VAR model for spillovers

- Bilateral US-WAEMU VAR models

$$\mathbf{Y_t} = \mathbf{C} + \mathbf{A_1}\mathbf{Y_{t-1}} + \ldots + \mathbf{A_{12}}\mathbf{Y_{t-12}} + \mathbf{e_t}$$

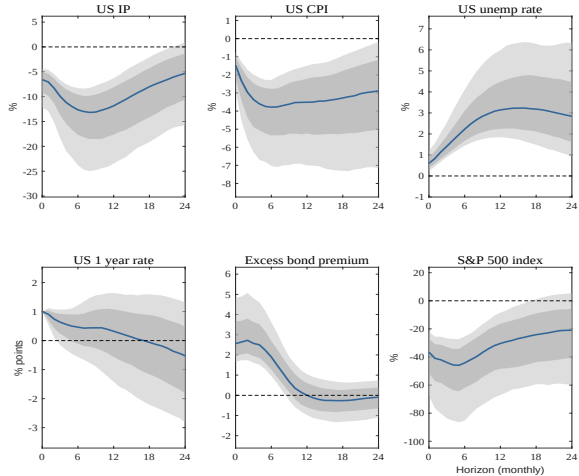
where

$$\mathbf{Y_t} = \begin{bmatrix} Y_t^{US} \\ Y_t^{WAEMU} \end{bmatrix} \qquad \mathbf{A}_k = \begin{bmatrix} A_k^{US,US} & 0 \\ A_k^{US,WAEMU} & A_k^{WAEMU,WAEMU} \end{bmatrix}$$

- Estimation sample: 1999:01-2022:12
- Bayesian VAR(12) in log levels
- Asymmetric macro prior (Chan, 2022)
- External IV identification with FF4-based IV (Miranda-Agrippino and Ricco, 2021)
- IRFs:
  - Aggregate WAEMU variables or
  - Aggregation of country level variables into median economy response

Fed conventional monetary policy shock

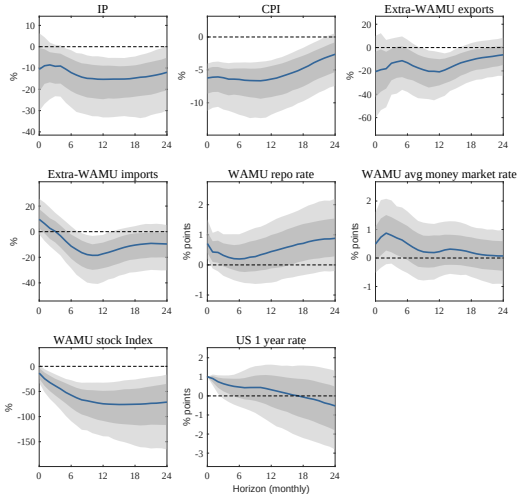
US block in US-WAEMU model with aggregated data



Median responses to a 1% point increase in US 1 year government bond rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Fed conventional monetary policy shock

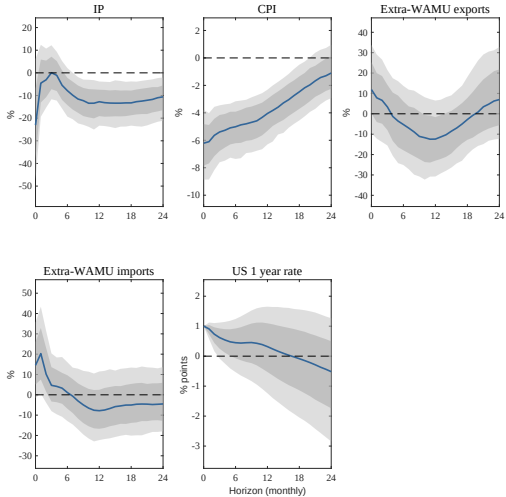
Spillovers in US-WAEMU model with aggregated data



Median responses to a 1% point increase in US 1 year government bond rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Fed conventional monetary policy shock

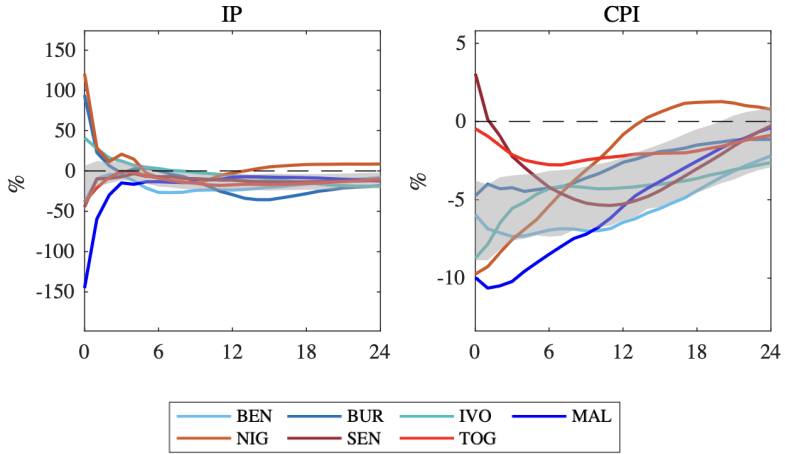
Median-median spillovers with country data



Median-median responses to a 1% point increase in US 1 year government bond rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Fed conventional monetary policy shock

Heterogeneity at country level



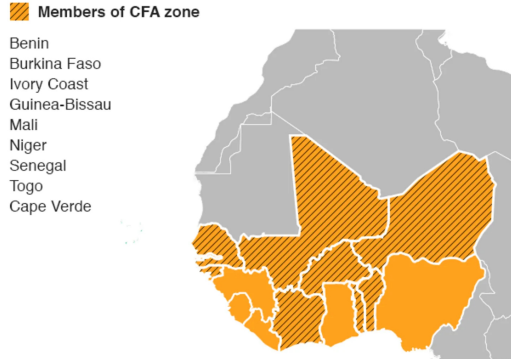
Median-median responses to a 1% point increase in US 1 year government bond rate. Dark and light shaded areas represent 68% and 90% posterior coverage bands respectively.

Conclusions

- The WEAMU is an important example of regional integration and currency union

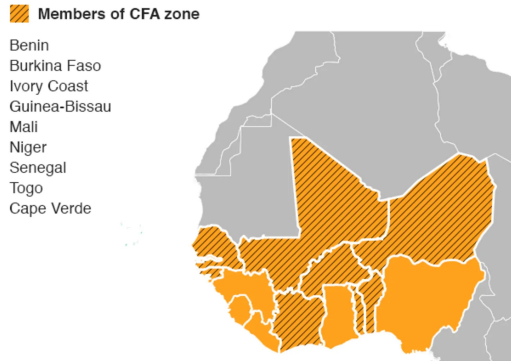
Conclusions

- The WEAMU is an important example of regional integration and currency union
- ... holds lessons for the future (ECOWAS currency & beyond)
- Important scientific debate on monetary independence and pegs



Conclusions

- The WEAMU is an important example of regional integration and currency union
- ... holds lessons for the future (ECOWAS currency & beyond)
- Important scientific debate on monetary independence and pegs



- Preliminary study of the transmission of domestic and foreign monetary shocks
  - Weak domestic transmission
  - Spillovers from the EA and the US
  - Limited degree of isolation
  - Demand channel
  - ... and potentially financial channel via changes to risk attitude ...
  - ... and pricing of treasury bonds (TBC!)
  - Puzzling heterogeneity

Appendix

Western African Economic Monetary Union

Top Trade Partners

Table 5: *Top export partners for West African economies*

Rank	Benin	Burkina-Faso	Ivory coast	Guinea-Bissau	Mali	Niger	Senegal	Togo
1	Bangladesh (22.7)	Switzerland (52.7)	Netherlands (11.4)	India (86.6)	South Africa (41.0)	France (31.3)	Mali (19.2)	Burkina Faso (17.9)
2	India (18.3)	India (15.3)	USA (9.2)	Singapore (12.1)	Switzerland (21.4)	Thailand (11.6)	Switzerland (15.0)	Benin (14.3)
3	Vietnam (10.0)	Singapore (7.7)	Vietnam (6.8)	Portugal (0.5)	Burkina Faso (6.1)	Malaysia (11.1)	India (8.4)	Ghana (7.6)
4	Nigeria (7.9)	Ivory coast (6.3)	Germany (6.4)	Netherlands (0.3)	Bangladesh (5.8)	Nigeria (9.5)	Bunkers (4.5)	Niger (6.4)
5	China (7.7)	France (4.2)	France (5.4)	Panama (0.2)	Ivory Coast (4.9)	Mali (5.6)	Spain (3.8)	India (6.1)
Top 5 Total(%)	66.6	86.2	39.2	99.7	79.2	69.1	50.9	52.3
% Share of EA in Top 5	0	4.8	59.2	0.8	0	45.3	7.5	0

Source: World Integrated Trade Solution. Benin: 2018; Burkina Faso: 2018; Ivory coast: 2018; Guinea Bissau: 2005; Mali: 2017; Niger: 2016; Senegal: 2017; Togo: 2017.

◂ WAEMU trade share to euro area

Western African Economic Monetary Union

Top Trade Partners

Table 6: *Top import partners for West African economies*

Rank	Benin	Burkina-Faso	Ivory coast	Guinea-Bissau	Mali	Niger	Senegal	Togo
1	Thailand (14.0)	China (12.7)	China (15.0)	Senegal (40.9)	Senegal (20.5)	France (28.3)	France (12.7)	China (19.6)
2	India (12.1)	Ivory coast (11.5)	Nigeria (12.3)	Portugal (37.2)	China (15.2)	China (16.2)	China (11.1)	France (10.8)
3	Togo (9.3)	France (7.2)	France (10.3)	Thailand (7.0)	Ivory Coast (9.7)	USA (7.8)	Nigeria (8.7)	Japan (5.1)
4	China (7.8)	USA (5.7)	India (4.6)	Netherlands (6.0)	France (7.9)	Nigeria (5.8)	Netherlands (6.5)	Netherlands (5.0)
5	France (7.1)	Russia (5.5)	Netherlands (3.7)	France (3.2)	Germany (3.6)	Thailand (5.8)	India (6.4)	Ghana (4.1)
Top 5 Total	50.3	42.6	35.9	94.3	56.8	63.9	45.4	44.6
Share of EU in Top 5	14.1	16.9	38.9	49.2	20.2	44.3	42.3	35.4

Source: World Integrated Trade Solution Benin: 2018; Burkina Faso: 2018; Ivory coast: 2018; Guinea Bissau: 2005; Mali: 2017; Niger: 2016; Senegal: 2017; Togo: 2017.

◂ WAEMU trade share to euro area

EU countries Trade invoicing

Table 7: *Annual Trade Invoicing during 2016-19 (in %)*

	Bulgaria		Croatia		Denmark		Norway		Sweden		Switzerland		UK	
	EX	IM	EX	IM	EX	IM	EX	IM	EX	IM	EX	IM	EX	IM
Euro	64	71	78	73	45	49	40	34	54	62	29	44	30	33
USD	34	26	20	20	25	28	47	24	27	29	21	36	29	41
Total	98	96	98	94	70	77	87	59	81	92	50	80	59	74

Source: Boz *et al.* (2020)

◂ WAEMU countries' invoicing

Trade share of Euro Area

Trade share of Euro Area with non-EA Euro countries

Table 8: *Trade share with Euro Area*

	Exports				Imports			
	2016	2017	2018	2019	2016	2017	2018	2019
Bulgaria	47.0	45.1	47.6	46.4	45.5	44.3	44.3	43.0
Croatia	54.9	53.3	56.3	55.4	60.7	60.0	59.6	61.2
Czech Rep.	65.1	65.2	65.6	65.0	60.1	59.2	58.2	58.0
Denmark	38.1	36.5	37.4	36.4	48.0	46.8	47.8	47.4
Hungary	59.2	58.5	58.7	59.3	59.7	58.4	57.1	56.2
Norway	44.0	44.8	46.5	43.5	34.6	33.3	34.0	32.3
Poland	56.5	57.0	57.8	57.5	58.6	58.2	56.8	56.0
Romania	55.1	56.1	56.8	56.4	55.1	53.7	53.3	52.5
Sweden	40.9	40.9	41.5	40.3	51.9	52.4	51.0	51.5
Switzerland	34.9	36.6	37.9	37.6	45.5	48.8	49.7	49.5
UK	41.8	42.1	41.5	41.1	43.9	44.8	45.3	42.7

Source: World Integrated Trade Solution

◂ EA share in WAEMU trade