Announcement and Implementation Effects of Central Bank Asset Purchases

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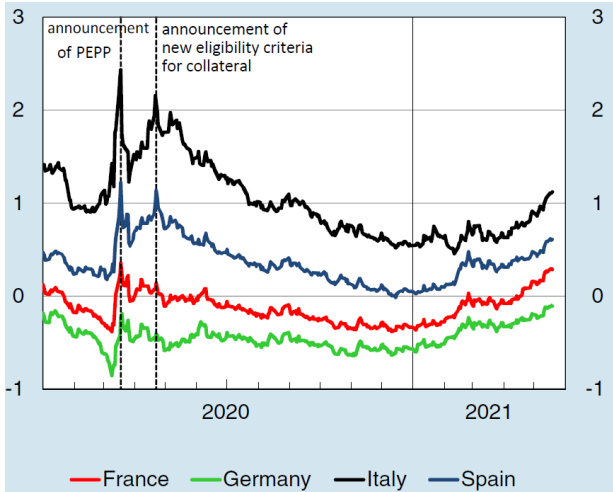
Effects of asset purchases

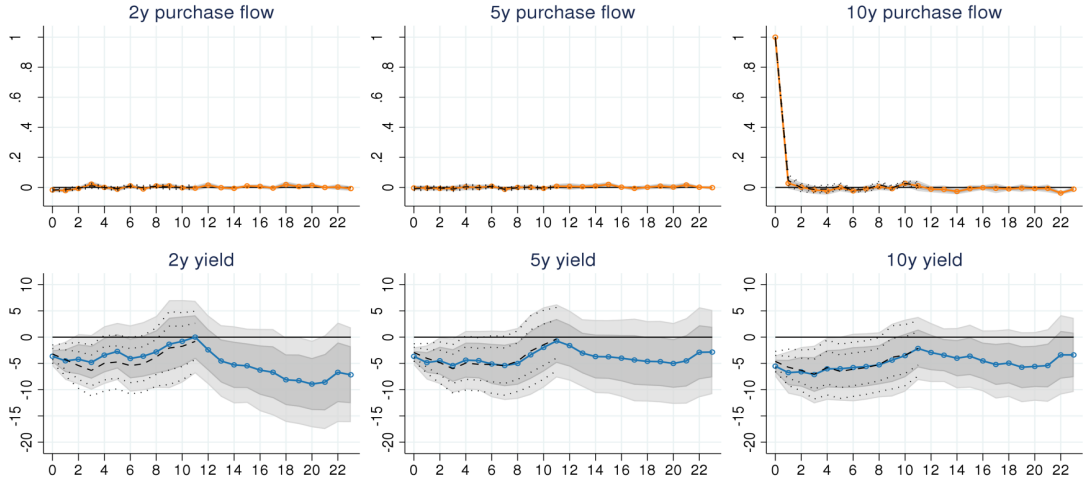
- Since the GFC asset purchases (APs) have become an integral part of the monetary policy toolkit of many central banks
- APs affect financial markets through **several distinct channels**
- Through these channels, **two types of effects** can emerge: stock and flow effects

Announcement (stock) effects



- Set in motion by changes in the stock of assets held by the central bank in its balance sheet
- Typically arise upon announcement

Implementation (flow) effects



- Emerge with the actual implementation of APs in the market (Bernardini and De Nicola, 2020)

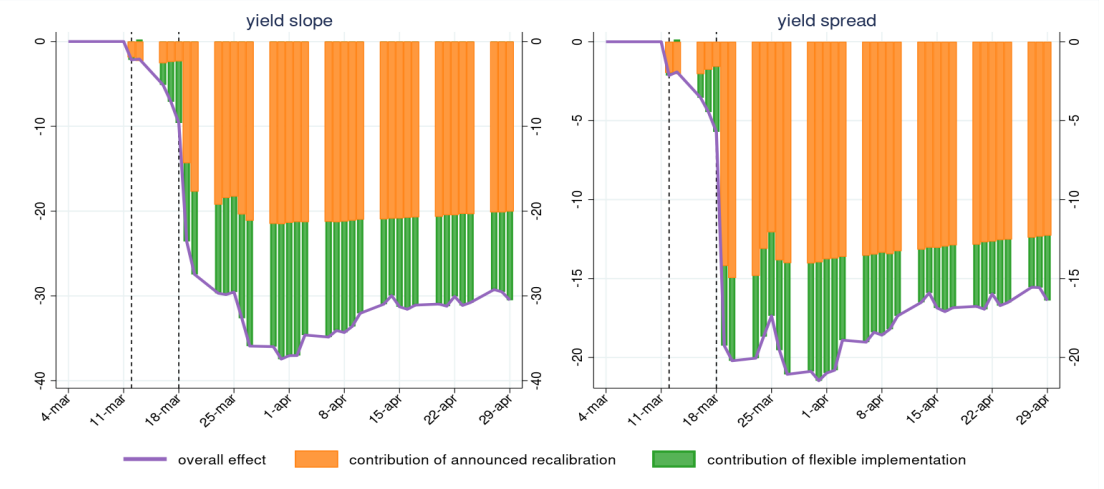
Research gap

- Questions:
  - what is the **overall impact** stemming from all these effects over time?
  - what is the **relative contribution** of announcements and implementation choices?
- Extensive empirical evidence based on ”narrow” methods (event-study and granular cross-sectional regressions)
  - great at establishing clear causal links
  - less equipped to tackle these questions, which are inherently macro

Our paper

- Simple VAR model
- Two key pillars:
  1. **confidential daily dataset** covering Eurosystem purchase flows from 2014 to 2021
  2. **novel high-frequency identification** based on the combination of external instruments, zero-sign restrictions, and narrative restrictions

Sneak peek at the model's primary contribution



- **Stock-flow decomposition** of the impact of APs

Plan of the talk

1. Model overview

2. Model validation

3. Stock-flow decomposition

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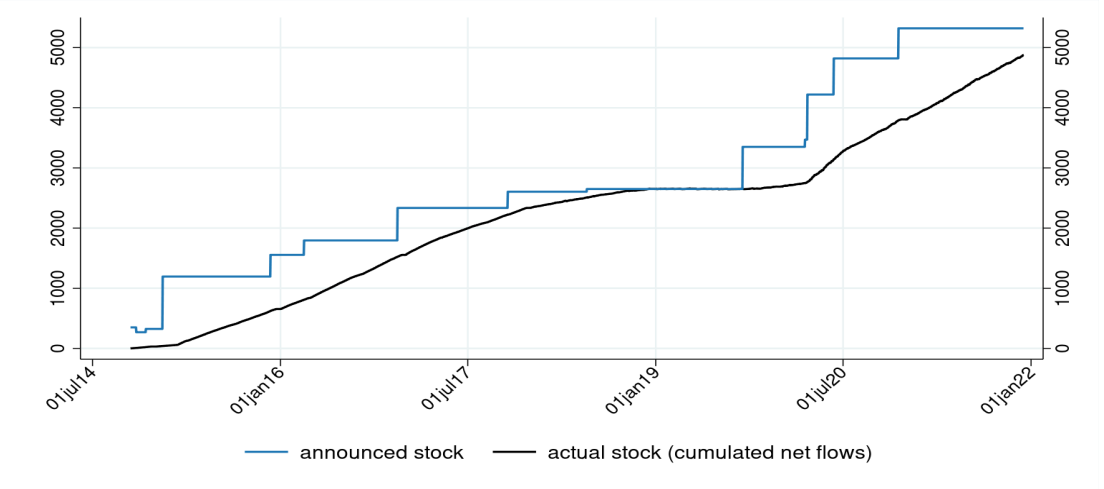
Model

$$y_t = c + A(L)y_{t-1} + u_t \tag{1}$$

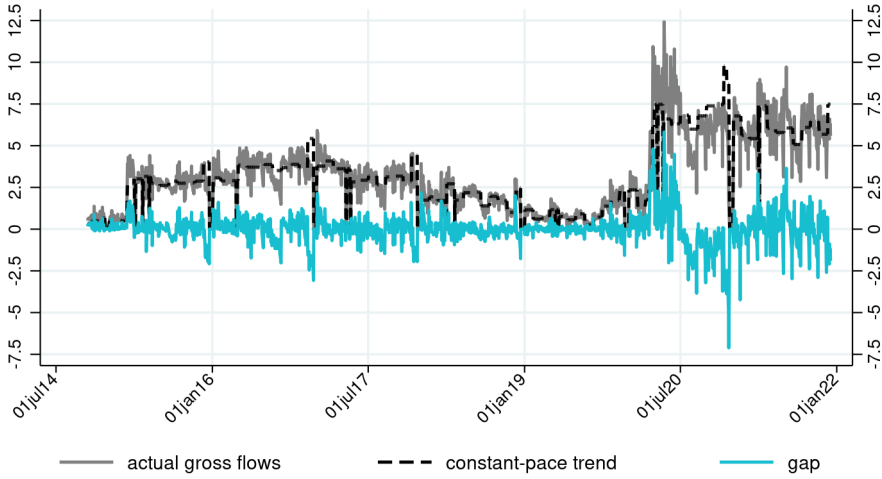
- Simple VAR model at **daily frequency** (weekdays)
- 2 asset purchase variables + 4 financial variables

Asset purchase variables: announced stock



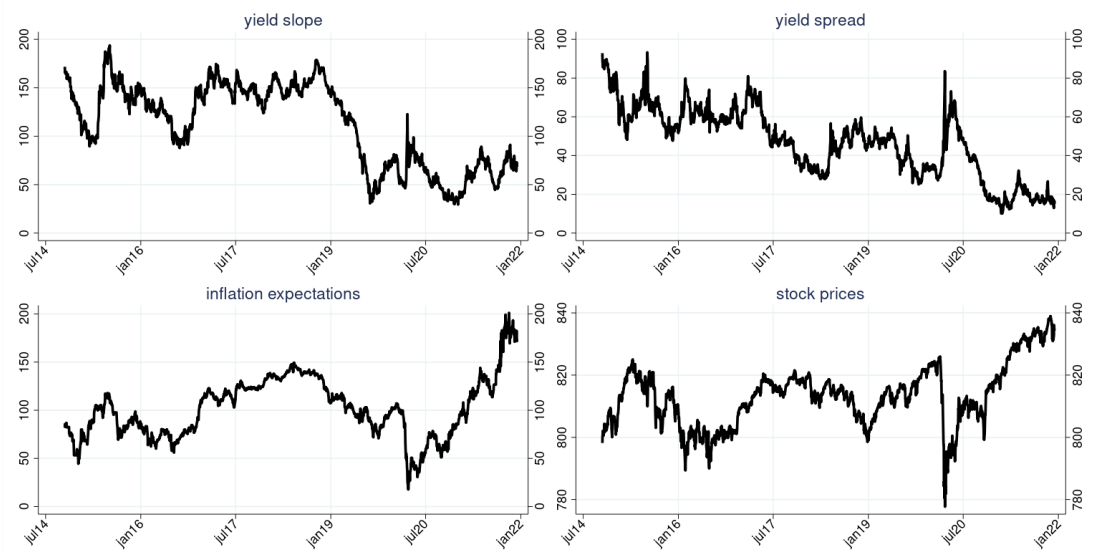
- It takes into account past, current, and **announced future purchases**
- The latter drive the gap between the announced and the actual stock

Asset purchase variables: implemented flows



- We remove the underlying trend which is known in advance by the markets
- It measures the **degree of temporal flexibility** in the conduct of asset purchases

Financial variables



High-frequency identification

Extended identification

	AP shocks		non-AP shocks	
	announcement (more)	implementation (more)	within-day response (financial) (more)	lagged response (more)
announced stock	proxy			
implemented flows	proxy	> 0	> 0	$= 0 \quad = 0 \quad = 0$
yield slope	proxy	< 0	> 0	
yield spread	proxy		> 0	
inflation expectations	proxy			
stock prices	proxy		< 0	

- AP shocks
  - announcement shocks: identified using survey-based surprises
  - implementation shocks: identified using sign + narrative restrictions

- non-AP shocks
  - shocks that trigger a *stabilizing within-day* response by the central bank (financial shocks)
  - shocks trigger a *delayed* response by the central bank (demand, supply, other financial shocks)

Plan of the talk

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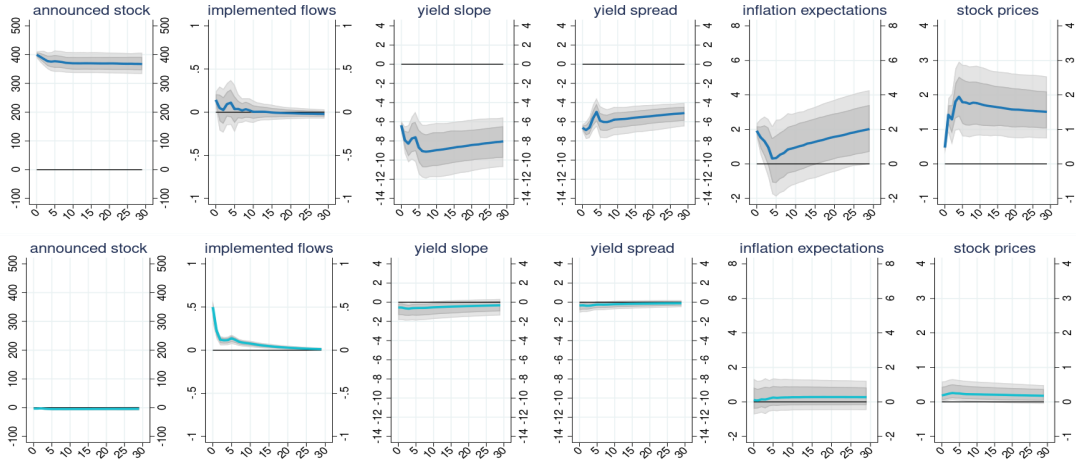
Transmission of asset purchase shocks

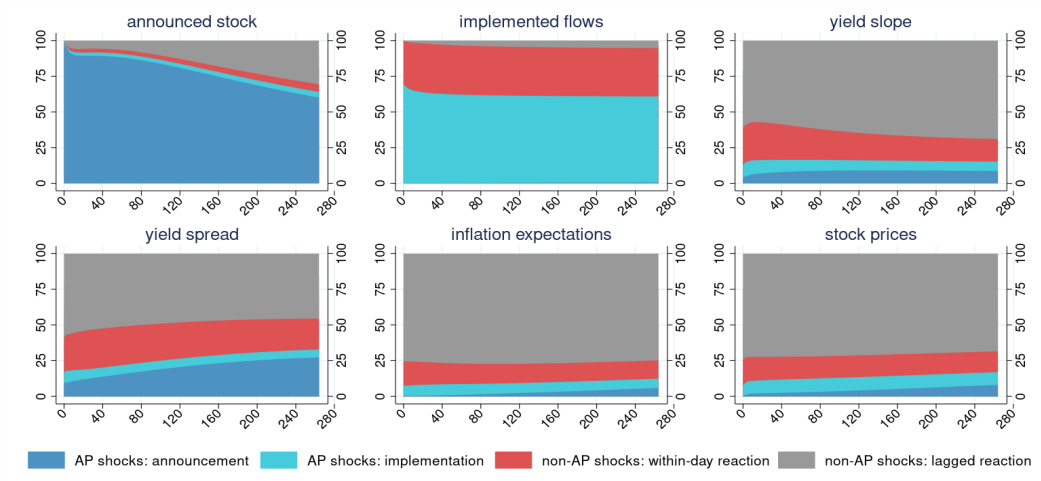
▸ WD non-AP shocks



- Both shocks ease financial conditions and raise inflation expectations
- Announcement shocks exert **larger and more persistent effects** than implementation shocks

Relevance of shocks *on average*

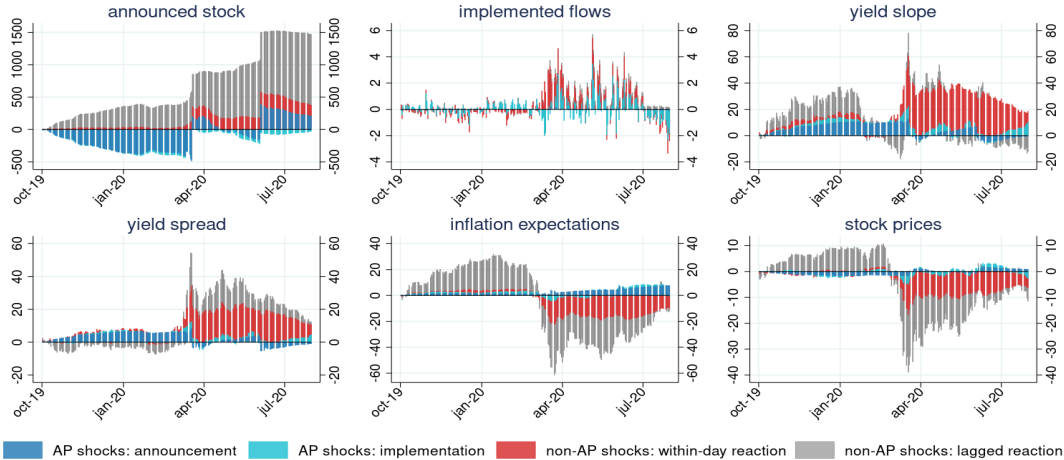
Extended model



- Stock and implementation choices partly driven by a **systematic reaction** to macro and fin shocks (gray+red areas), which also drive the bulk of the variation in financial market variables

Relevance of shocks *around the height of the Covid-19 crisis*

Extended model



- Step-up in actual purchases at the height of the crisis **correctly identified as an endogenous reaction of the ECB** to the sudden and marked deterioration of financial markets' conditions

Plan of the talk

1. Model overview

2. Model validation

3. Stock-flow decomposition

Design of policy counterfactuals

- First attempt in the literature
- Based on two alternative structural policy scenarios
  1. no recalibration of announced stock + no use of temporal flexibility
  2. no use of temporal flexibility

Overall impact (1) = contribution of implemented flows (2) + contribution of announced stock (1-2)

Effects of APs in the aftermath of the PEPP announcement

More APP

- Substantial frontloading: around €60 bn over the analyzed period
- **Sizable impact** of APs, of which a **non-negligible share linked to implementation choices**

Takeaways

1. **New model** to evaluate and compare announcement and implementation effects of APs
2. Despite its simplicity, the model is able to produce **facts consistent with prior research and prevailing narratives**
3. **QE cannot be evaluated simply based on announcement effects**: risk of underestimating/overestimating its effectiveness

Avenues for future research

1. **State-dependent version** in good and in bad times
2. **Generalized version** to analyze both QE and QT
3. **Mixed-frequency version** to analyze macro effects of realized inflation
4. **Panel version** to also analyze cross-country flexibility

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Additional slides

Identification of announcement shocks

back

- Shocks to the announced stock of purchases are identified using an external instrument
- The instrument (or proxy) measures survey-based surprises about the announced stock (Lhuissier and Nguyen, 2021)
- Technically, we assume that the instrument is correlated with announcement shocks but is uncorrelated with all the other shocks (Mertens and Ravn, 2013; Stock and Watson, 2018)

External instrument

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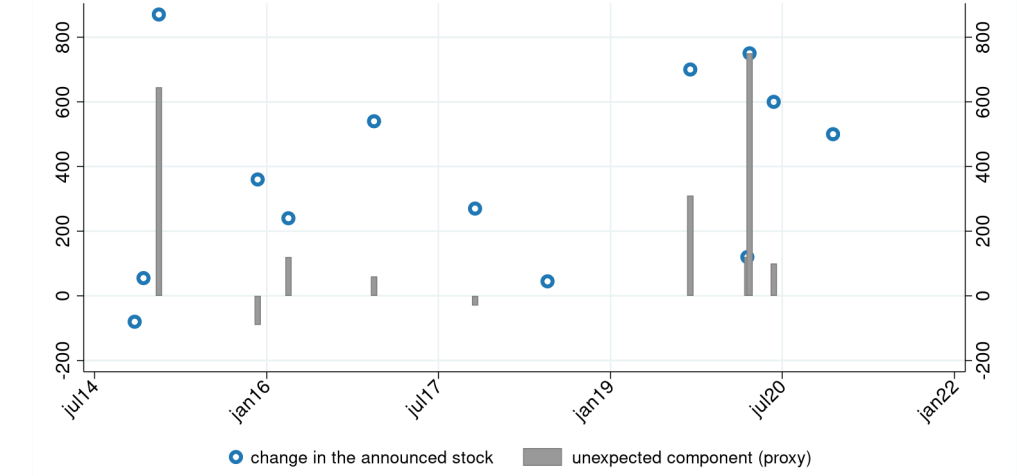

- In many cases announcements were anticipated or even overestimated by market analysts

Identification of implementation shocks

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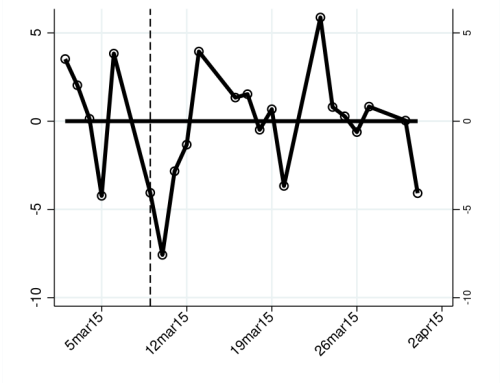
- Shocks to the implemented purchase flows are identified with sign restrictions
- We assume that these shocks generate on impact a positive co-movement between actual purchase flows and asset prices
- This assumption is supported by a growing body of evidence on flow effects

Additional narrative restrictions

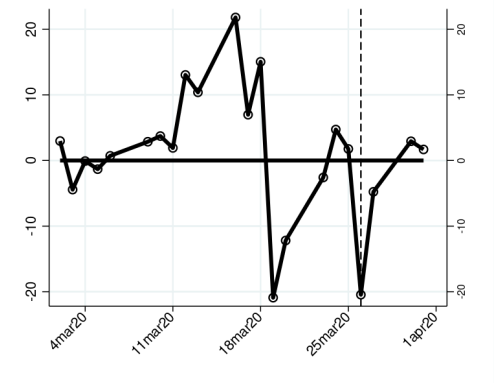
back

- We further assume that implementation shocks were a key driver of the frontloading in of actual purchases that occurred on the launch dates of the PSPP and the PEPP

- The timing, the magnitude, and the direction of the observed changes in market yields provide strong anecdotal support for our narrative assumption



(a) launch of the PSPP



(b) launch of the PEPP

Identification of non-AP shocks

back

- The other shocks are split in two broad categories using zero&sign restrictions
- Class #1: shocks that trigger a stabilizing within-day response by the central bank in terms of gross purchase flows (Ghysels et al., 2017; De Santis, 2020; Bernardini and De Nicola, 2020)
- Class #2: all the other shocks do not induce a within−day response by the central bank in terms of gross purchase flows, as their effects are assessed approximately every 6-7 weeks by the ECB Governing Council

Further disentangling the non-AP shocks

back

	AP shocks		non-AP shocks			
	announcement	implementation	within-day response	lagged response		
			financial	aggregate demand	aggregate supply	financial
announced stock	proxy					
implemented flows	proxy	> 0	> 0	$= 0$	$= 0$	$= 0$
yield slope	proxy	< 0	> 0	< 0	> 0	> 0
yield spread	proxy		> 0			> 0
inflation expectations	proxy			< 0	> 0	< 0
stock prices	proxy		< 0	< 0	< 0	< 0

Transmission of non-AP shocks

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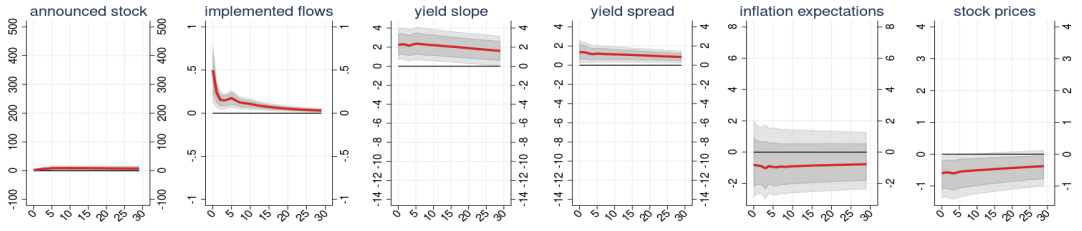

- Effects last for a longer period of time sufficient to restore the proper market functioning

Relevance of shocks *on average*

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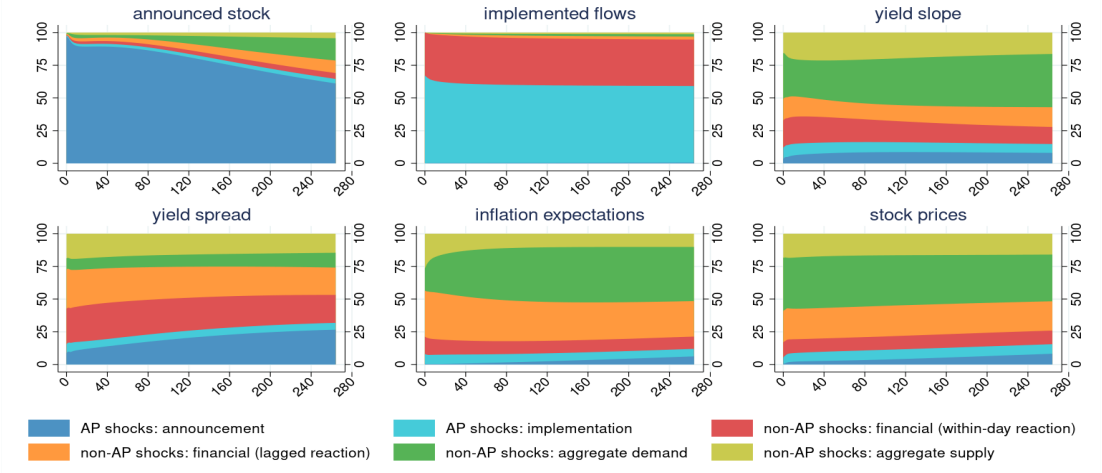
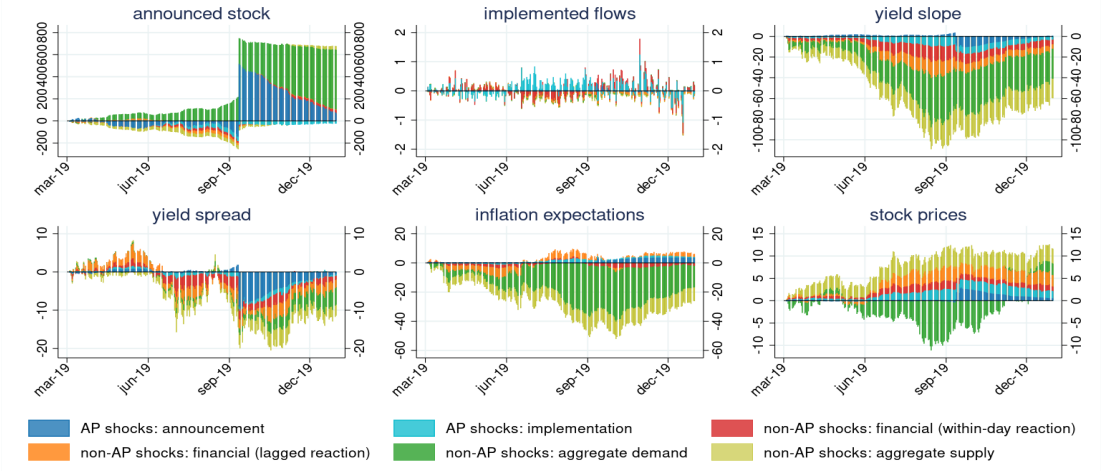


- The decision to restart QE in September 2019 was largely made in response to a severe slowdown in aggregate demand that has been going on from the beginning of that year

Relevance of shocks *around the APP restart announcement*

back



- The decision to restart QE in September 2019 was largely made in response to a severe slowdown in aggregate demand that has been going on from the beginning of that year

Aftermath of the PEPP announcement: scenarios

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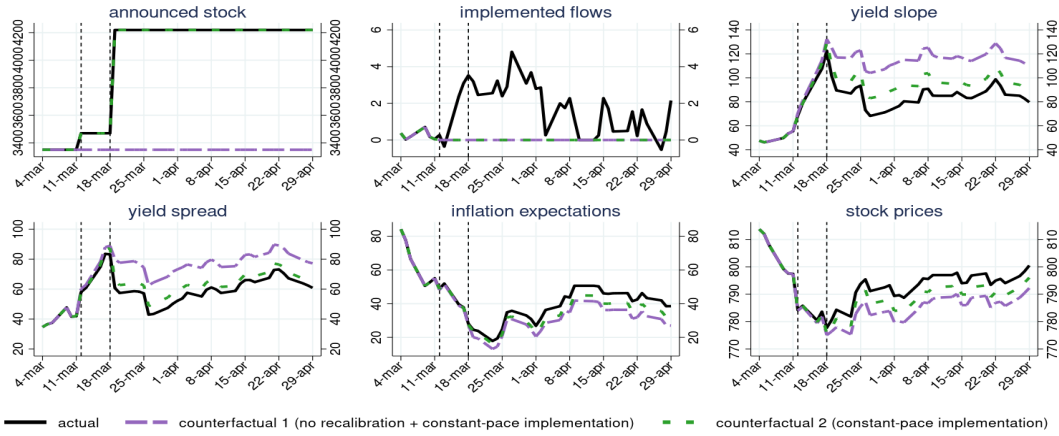

Aftermath of the PEPP announcement: effects

back

Table 3 – Effects of APs in the aftermath of the PEPP announcement

days after the announcement	announced stock		implemented flows		yield slope		yield spread		expected inflation		stock prices	
	overall effect (€ billion)	flexible impl. (€ billion)	overall effect	flexible impl.	overall effect (bp)	flexible impl. (bp)	overall effect (bp)	flexible impl. (bp)	overall effect (bp)	flexible impl. (bp)	overall effect (pp)	flexible impl (pp)
h=1	120.0	0.0	0.3	0.3	-2.2	-0.3	-2.1	-0.2	0.6	0.0	0.2	0.1
	–	–	–	–	*100.0*	*100.0*	*100.0*	*87.0*	*99.4*	*54.2*	*100.0*	*92.1*
h=5	120.0	0.0	3.5	3.5	-9.6	-7.3	-5.7	-4.1	0.7	0.7	2.7	2.1
	–	–	–	–	*100.0*	*99.4*	*99.2*	*90.6*	*55.8*	*54.9*	*99.6*	*97.7*
h=10	870.0	0.0	2.4	2.4	-29.5	-11.3	-17.4	-5.3	3.9	2.7	8.2	3.8
	–	–	–	–	*100.0*	*96.3*	*100.0*	*87.4*	*68.2*	*64.4*	*99.9*	*98.4*
h=20	870.0	0.0	2.3	2.3	-34.3	-13.1	-18.6	-5.2	8.9	5.9	8.8	4.8
	–	–	–	–	*99.9*	*87.2*	*100.0*	*76.7*	*78.5*	*70.9*	*99.6*	*92.4*
h=30	870.0	0.0	0.2	0.2	-30.1	-9.6	-16.0	-3.3	10.6	6.2	8.1	4.3
	–	–	–	–	*99.7*	*78.5*	*99.9*	*70.7*	*82.9*	*72.1*	*98.7*	*89.2*

Note: For each variable and considered horizon (i.e., days after the announcement of a policy recalibration) the Table shows the effect attributable to the overall announcement and the flexible implementation (straight entries), together with the associated probability – based on the posterior distribution of the VAR model – that the counterfactual effect is greater (if positive) or lower (if negative) than zero (*italics* entries). The announcement is given on March 12, 2020 (October 26, 2017) for Panel a. (Panel b.) and it is then followed by the launch of the PEPP on March 19, 2020. Notice that since the counterfactual paths of the policy variables are imposed, no *associated probability* is reported. All entries refer to the counterfactuals shown in Figure 12b.

- The probability that these counterfactual effects are at their peak greater than zero (or lower than zero in the case of stock prices) is estimated in a range between 90 and 95 per cent for all financial variables, with the exception of inflation expectations (70 per cent)

Aftermath of the PEPP announcement: plausibility

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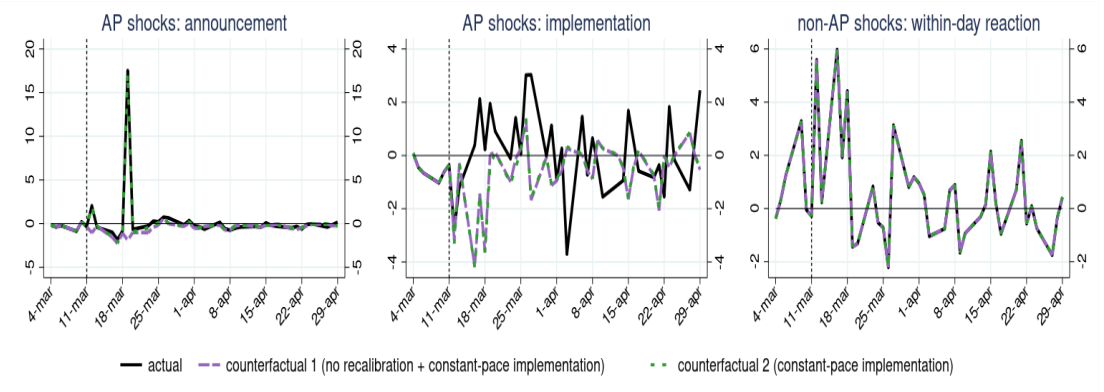

- Plausibility of our counterfactuals (Kilian and Lütkepohl, 2017)

Aftermath of the APP announcement: decomposition

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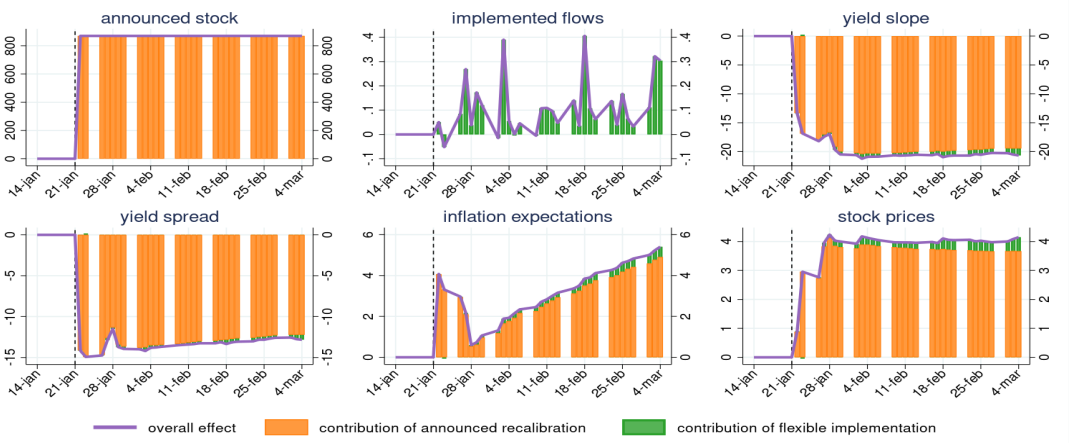

- Negligible frontloading
- The smaller impact of APs on financial conditions upon the APP announcements stems from the contribution of the implementation, which was almost nil at that time.

Aftermath of the APP announcement: effects

back

Table 4 – Effects of APs in the aftermath of the PSPP announcement

days after the announcement	announced stock		implemented flows		yield slope		yield spread		expected inflation		stock prices	
	overall effect (€ billion)	flexible impl. (€ billion)	overall effect (€ billion)	flexible impl. (€ billion)	overall effect (bp)	flexible impl. (bp)	overall effect (bp)	flexible impl. (bp)	overall effect (bp)	flexible impl. (bp)	overall effect (pp)	flexible impl (pp)
h=1	870.0	0.0	0.1	0.1	-13.4	-0.1	-14.2	0.0	4.1	0.0	0.9	0.0
	–	–	–	–	*100.0*	*100.0*	*100.0*	*87.0*	*100.0*	*54.2*	*99.8*	*92.1*
h=5	870.0	0.0	0.0	0.0	-17.0	-0.3	-11.5	-0.2	0.6	0.0	4.2	0.1
	–	–	–	–	*100.0*	*96.7*	*100.0*	*89.8*	*56.8*	*54.6*	*99.8*	*98.2*
h=10	870.0	0.0	0.1	0.1	-20.9	-0.6	-13.8	-0.3	1.9	0.1	4.1	0.2
	–	–	–	–	*100.0*	*95.2*	*100.0*	*87.2*	*72.2*	*59.8*	*99.8*	*98.3*
h=20	870.0	0.0	0.4	0.4	-21.0	-1.0	-13.4	-0.5	3.9	0.3	4.1	0.3
	–	–	–	–	*100.0*	*93.5*	*100.0*	*83.1*	*88.1*	*63.6*	*99.8*	*94.9*
h=30	870.0	0.0	0.3	0.3	-20.7	-1.3	-12.8	-0.6	5.4	0.4	4.1	0.4
	–	–	–	–	*100.0*	*89.3*	*100.0*	*80.6*	*94.0*	*65.8*	*99.8*	*94.1*

Note: For each variable and considered horizon (i.e., days after the announcement of a policy recalibration) the Table shows the effect attributable to the overall announcement and the flexible implementation (straight entries), together with the associated probability – based on the posterior distribution of the VAR model – that the counterfactual effect is greater (if positive) or lower (if negative) than zero (*italics* entries). Notice that since the counterfactual paths of the policy variables are imposed, no *associated probability* is reported. All entries refer to the counterfactuals shown in Figure 11b.

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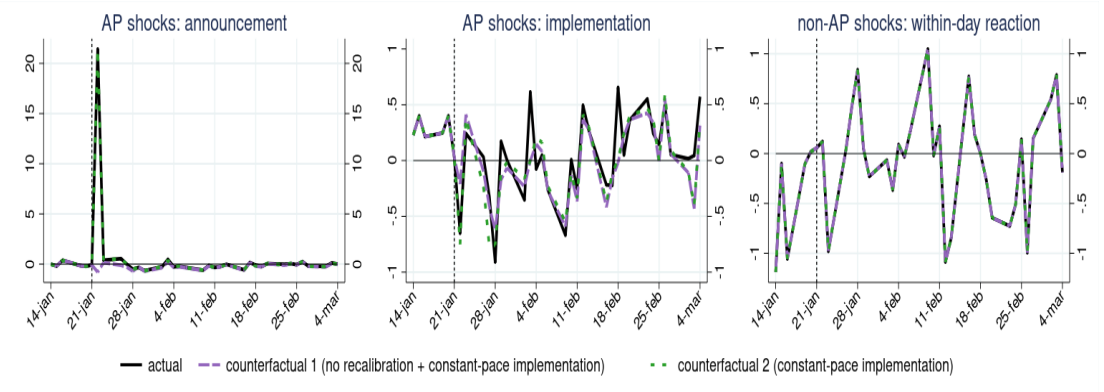
Aftermath of the APP announcement: plausibility

back



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