CENTRAL BANK ASSET PURCHASE PROGRAMS

ECB Bond Market Contact Group 8 April 2014

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Central Banks Asset Purchase Programmes - channels of operation

Central Banks' Asset Purchase Programmes

Increase of monetary base (generation of reserves)	Weakening of the currency	Portfolio shifts to other asset classes (portfolio effect)	Confidence in CB commitment ("we'll do what it takes")
Higher monetary base puts pressure on banks to lend to the real economy, raising aggregate demand. This effect depends on sufficient equity in the banking system. Quantity theory of the price level should mean higher inflation. This depends on money velocity. The two effects above are in fact the same but stated in different terms	Increase in monetary base depresses interest rates and encourages the use of the domestic currency for funding of carry trades in other currencies. Weaker currency supports the price level via higher import prices.	Private investors need to replace the carry of the bonds they sell to the CB with other assets. This can stimulate lending in riskier asset classes, particularly if net supply of govt bonds becomes negative At the same time, interest rate levels decline, stimulating borrowing and portfolio shifts into riskier assets.	Independent of any direct economic impact, a QE programme signals determination of the CB to act in a decisive manner. This effect is not quantifiable and depends on non-market actors adjusting their expectation of future price developments. Effective execution is of particular importance to secure market conviction in competence of CB

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Questions

What to buy

Private sector assets	Government bonds
+ Most direct effect on private sector funding levels + Reduction in banking system RWA + Avoidance of monetary financing prohibition - Low liquidity - In euro area: Strong variance in availability of assets	+ Relatively high liquidity across all member states - Only indirect and uneven effect on private sector funding - Potential conflict with article 123 TFEU seen - Short squeeze risk in GE, FR due to CB involvement

Maturity Range

Short end (1-5Y)	Medium (5-10Y)	Long end (10Y+)
+ Considered monetary policy range + High relative liquidity + Self-liquidating balance sheet - Other alternatives available (LTRO)	- Not seen as MP relevant + Stronger effect on corporate funding + Radiates down to shorter maturities - Need to consider ways to sell stock	- Low relative liquidity - Active exit strategy mandatory - Exacerbates ALM problems in L&P - Varied supply (lot AT, little FI)

Who to buy from

Everyone	Dealers only
+ No suggestion of channelling extra fees to dealers + Non-bank investor participation - Public exchanges can not handle flow - Impact would leak out of banking system - Higher number of potential disputes	+ Use existing relationships - Dealers could be seen as benefiting from bid/offer(but cf Japan)

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Questions

How often

Few large operations	Many small operations	"Dutch Direct Reverse Auction"
+ Easy to do - Large strain on liquidity during ops	- More conflicts with other events - More operational efforts + Less gap risk during single operation	[Continuous buyback over time window] + Agent can control flow over time + Auction itself less likely to strain market - No experience, participation unclear

What to buy in each operation

All bonds in a defined basket	Specific issues only
+ Auction less likely to lead to short squeezes + More size possible per operation - Clearly defined pricing benchmark required	+ Very simple pricing - Requires liquidity in off-the-run issues - Higher number of operations in eurozone

How to select offers

Cheapest price	Relative value
+ Easiest and most transparent measure - Inapplicable for buy-backs of bond baskets	- Requires transparent benchmark curve + Suitable for basket operations - No obvious benchmark in EUR (ECB curve intransparent)

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Recent Central Bank Asset Purchase Programmes

Program	Start Date	Total Size	Monthly Purchase	Cumulative Size as % of GDP (as of Mar-14)	Purchase sector	Purchase method	Frequency of operation
Fed QE1	Nov-08	$600bn ($500bn MBS, $100bn Agency)	~$90bn/mth of MBS; ~$10bn/mth Agency	23%	MBS: 15yr and 30yr Agency: fixed rate, non-callable, senior benchmark; UST: 2-10yr nominal UST and TIPS (max holding per issue is 35% of outstanding size)	MBS: daily purchase in secondary market via primary dealer; Agency: one auction per week, awards are based on a multiple-price competitive auction process; UST: multiple-price competitive auctions	MBS: Daily; Agency: weekly then reduce to bi-weekly; UST: 1-2 operations per week, maturity sector to be announced every other Wednesday for the following two weeks
Fed QE1.2	Mar-09	$1,150bn ($300bn UST, $750bn MBS, $75bn Agency)	~$90bn/mth of MBS; ~$10bn/mth Agency; UST: ~$30bn/mth				
Fed QE2	Nov-10	$600bn UST	~$75bn/mth		1-30yr nominal UST and TIPS (max holding per issue is 70% of outstanding size)	Competitive auction, awards are based on offers compared to secondary market price and the Fed's own fair value assessment of each security. Auction schedule is announced on monthly basis	18 operations per month
Fed QE Twist	Sep-11	Sell $400bn <3yr UST to buy 6-30yr UST	Purchase $44bn/mth vs $39bn of sale + redemption		Sell $400bn <3yr UST to buy 6-30yr UST	Purchases and sales through a competitive auction process	14 operations per month for nominal UST and 1 operation for TIPS
Fed QE Infinity	Dec-12	$40bn MBS per month; $45bn UST per month	$40bn MBS per month; $45bn UST per month		UST: 4-30y nominal UST and TIPS (max holding per issue is 70% of outstanding size)	Competitive auction	18 operations per month
BoE QE1	Mar-09	£200bn	~£16bn/mth	23%	5-25y nominal gilts	Competitive bids awarded via a variable rate auction, relative value based on offers compared to 'snapshot' yield curve at 2:15pm; Non-competitive bids are allocated at the weighted average price at which relevant stock was allocated at the competitive auction	3 operations per week
BoE QE2	Oct-11	£125bn	~£15bn/mth		3-25ys nominal gilts		
BoE QE2.1	Jul-12	£50bn	~12bn/mth		>3yr nominal gilts		
BoJ QE1	Oct-10	¥35trn then increased to ¥80trn in JGBs, T-Bills, CP, Corporate bonds, ETFs and J-REITs	Total purchase of ~¥3trn/mth then increased to ~¥7trn/mth	39%	<30yr JGBs, and floater and JGBi	JGBs, T-Bills, CP and Corporate Bonds: A multiple-price competitive auction, where counterparties bid yield at which they desire to sell JGBs or T-Bills to the Bank; ETFs and J-REITs: Purchase through a trust property through a trust bank	JGB: 3 operations per month; CP: 3 operations per month; T-Bills: 2-4 operations per month; ETFs and J-REITs: ad-hoc
BoJ QE Infinity	Apr-13	¥60-70trn per year of which ¥50trn in JGBs and ¥1trn ETFs and ¥30trn J-REITs (Net of Redemption)	¥7.5trn/mth of JGBs on gross basis		2y, 5y, 10yr, 20yr, 30yr, 40yr JGB floaters and JGBi	Fixed coupon bonds: counterparties bid "yield spreads" - spread of offer yields vs benchmark yields. Floating-rate and inflation-indexed bonds: counterparties bid "price spreads" - offer price vs benchmark prices	JGBs: 10 operations per month; JGBi and Floaters: 1 operation every other month
ECB SMP1	May-10	€78bn	Ad-hoc	3%	Greece, Portugal and Ireland 2-10yr nominal bonds	Purchase from the secondary market when the ECB perceived the market to be dysfunctional	Ad-hoc
ECB SMP2	Aug-11	€142bn	Ad-hoc		Italy and Spain 2-10yr fixed and floating rate bonds		

Source: Fed, BoE, BoJ, ECB, Bloomberg, Morgan Stanley Sales and Trading

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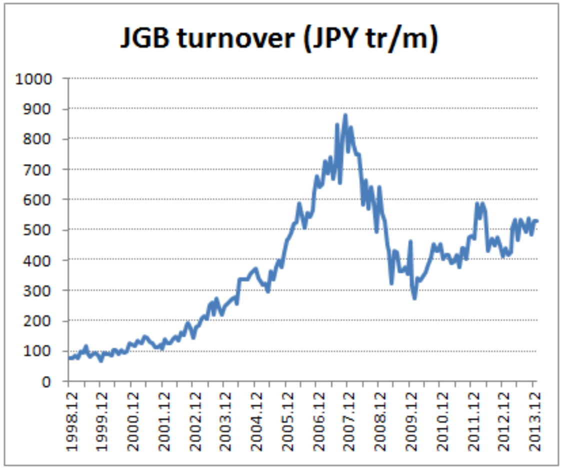
Pros and Cons of Recent Central Bank Asset Purchase Programmes

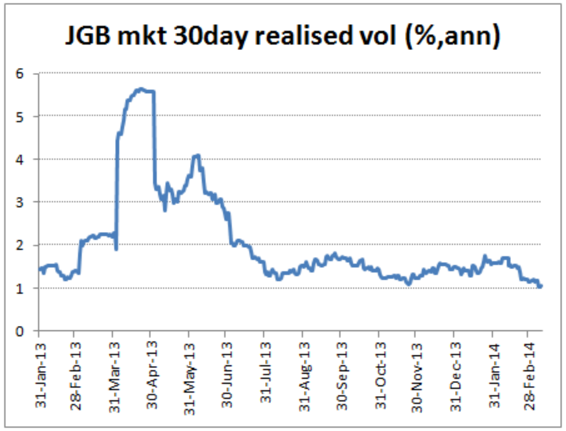
Program	Pros	Cons
Fed QE Infinity	For UST: - Overall program size and length announced in advance, and monthly auction schedule to provide transparency for the market - Predictability in terms of what bonds will be purchased based on the relative value metrics (spline) - Exclude CTD or repo special bonds to avoid squeeze in the market or illiquidity - Offers security lending program to improve secondary market liquidity if the Fed owns a large share of certain issues (max 70%) For MBS: -Forgo transparency and predictability and buy through secondary market via a trust bank to have more discretion and eliminate risk of illiquidity or market stress	For UST: - Lack of predictability of how much the Fed intend to allocate on each bond at each operation as the Fed retains some discretion towards the max holding % to avoid illiquidity in the markets - Lack of option to submit yields/DV01 (only price) in the auction system For MBS: - Lack of predictability and transparency as purchase is done on discretionary basis with the the trust bank asking for offers from dealers
BoE	- Predictability of the overall size and length of each program as it is usually announced quarterly (Inflation Report), and clear auction schedule announced monthly for maturity sector and size helps dealers to position their balance sheet in advance; - Auction price based on snapshot at 2.15pm which provide transparency for market participants to evaluate relative value and participate - Offers mini-tender and secondary lending program to improve liquidity in the secondary market if BoE holds a large share of certain issues (may 65%)	- Lack of predictability of how much the BoE intend to allocate on each bond at each operation (not entirely depend on the RV vs. the snapshot)
BoJ QE Infinity	- Overall size distribution across the JGB maturity buckets and operation size is known - Exclude future CTD bonds to prevent squeeze or illiquidity in the market - 10yr+ buyback usually follows after 20yr JGB issuance (though now announced formally), helps dealers to absorb supply and improve liquidity on the sector	- Operation schedule (including auction date, maturity and size) is only announced on the day of the operation, lack of predictability and transparency for the markets and does not help to improve liquidity; □
ECB SMP	-Supported the maintenance of reasonably orderly secondary markets (albeit with reduced liquidity); - Prevented a major idiosyncratic confidence shock that could have led to self-fulfilling destructive dynamics, which preserved the monetary policy transmission mechanism	- Lack of predictability and consistency as all purchase are made on ad-hoc basis and no transparency on how the ECB decide which bond and what valuation metric is used. Market became more dysfunctional as SMP supported the short-end which led to squeeze of the market whilst the long-end had no ECB or market support ; - Hence failed to reduce volatility and provide confidence to the market for participants to manage risk effectively; - No commitment on length or size of the overall purchase which failed to persuade investors for the funding access of the sovereign markets; - Lack of consistency across difference NCBs in buying behaviour

Source: Fed, BoE, BoJ, ECB, Bloomberg, Morgan Stanley Sales and Trading

The Bank of Japan approach

- Bank of Japan announced QE on 4 April 2013 and had to change operational details within a couple of weeks
- BoJ buys from baskets of JGB spread all over the curve (JPY 50tr/y) and additionally private sector assets (1tr ETF, 30bn REIT, CP and corporate bonds are rolled at 2.2tr and 3.2tr)
- Size distribution across JGB maturity buckets and operations size is known, but what operations take place on what day (usually 2) is only announced on the day of the operations
- Operations were sized at around EUR 7bn per purchase (2bn in long end; cf 10Y JGB auction EUR 16.9bn) (11 operations on 6 days)
- Within the basket, BoJ ranks bids according to the yield change from the previous day's close (Brokers' Broker) which favours longer bonds in steepening, shorter bonds in flattening environments
- An initial problem was that with the short warning available, dealers were unable to source the required volume
  - BoJ operations department held a public consultation on the structure of operations
- Number of operations was raised to 17 on 8 days a month on 18 April, and then to 19 on 10 days per month on 30 May
- Dealers do not benefit from extra business as liquidity is still low and volatility has declined since the VaR shock of April 2013





Source: JSDA, DBIQ, DB

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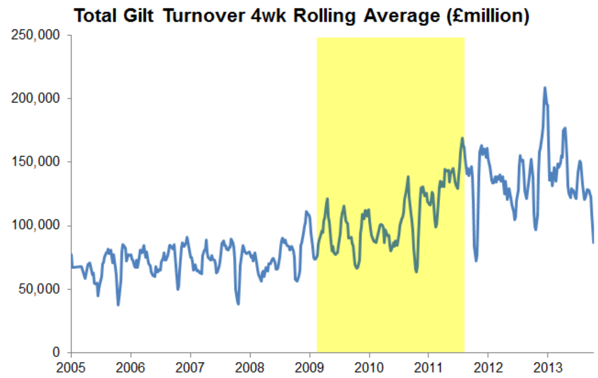
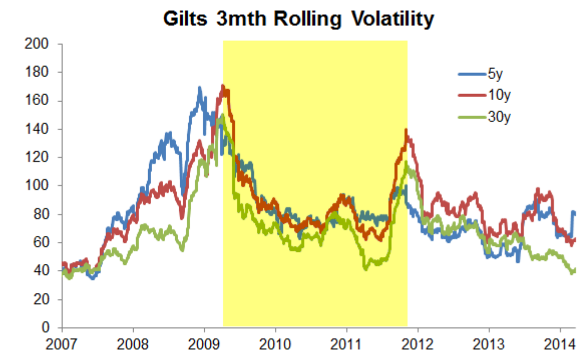
The Bank of England approach

- BoE first announced the Asset Purchase Facility to purchase £75bn gilts and private sector corporate bonds in Mar 09, and subsequently increased the size to £375bn which was completed in Oct 12 (only £0.1 corporate bonds were purchased). In Mar 13 BoE also announced to reinvest the coupon of the APF gilts stock
- BoE buys all >3y maturity gilts, apart from linkers or stocks with an outstanding size less than £4bn or newly-issued gilts within one week of issue. The BoE ceases to purchase any stock once the BoE holds more than 70% of the 'free float' of that issue.
- BoE offers to purchase the gilts via reverse auctions and announces on each Thursday at 4pm for the following week of what sector (3 auctions a week for 3-7yr, 7-15yr and >15yr sectors) and amount (around £1.4bn each auction) it will buy at each auction.
- The auctions accept both competitive and non-competitive bids. The BoE used a 'snapshot' of the market at 2.15pm and the successfully competitive price is determined by the best offers compared to the 'snapshot' as a variable rate auction. Non-comp bids are allocated at the weighted average price at which the relevant stock was allocated at the competitive auction.
- Volatility was pushed lower by the APF, but the transparency of the APF (clear auction schedules and each program usually runs quarterly between Inflation Reports) provided confidence for dealers to warehouse the increased supply of gilts since 2009 and increased turnover/liquidity of the gilt market.





Source: DMO, Bloomberg, MS

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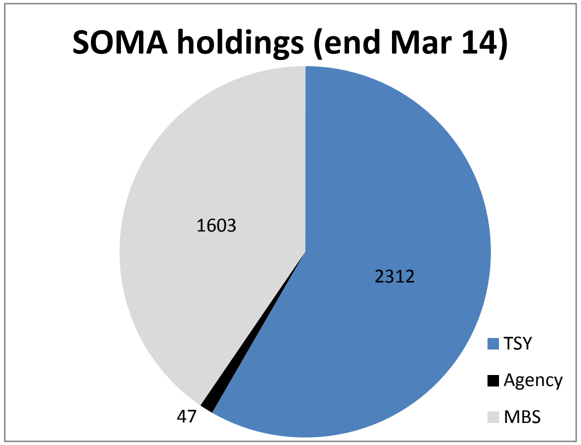
The Fed approach

- The Fed executed a number of outright purchase programmes, targeting first private debt (Agency bonds and mortgages), then also Treasuries
- From September 2011, the Fed conducted 'Operation Twist', extending average TSY portfolio duration by selling short-dated (<3Y) and buying long-dated (>6Y) par for par
- Fed reinvests agency and mortgage principal as well as rolling TSY maturities at auction
- QE is being wound down and will finish (reach static SOMA portfolio size) around October at the current pace
- Fed implements operations via the Open Market Desk at the NY Fed in 18 operations per month
- Ahead of each operation, NY Fed announces type and maturity range of securities to be bought, potentially also excluded CUSIPs
- Price acceptance is based on a proprietary Fed RV model
- SOMA ownership is capped at 70% of outstanding per issue but purchase caps apply from 30% outstanding held (takes ≥18 operations to get to 70% outstanding held)



Source: FRB

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Current debates

Asset purchase programs and the rates cycle

2014 vs. 2009-2011: Fed, BoE, BoJ started QE in a materially weaker point of the cycle

Sustainability: how close are we to exit in a late cycle QE how does it feed into the market reaction function

But questions marks in Japan…: Have Japanese yields remained low because of fears that the BoJ will ultimately be unable to create inflation or because of market technicals ?.

End-investor behavior

Would large holders of € FI sell: for example large foreign central banks, SWF

No clear alternative asset: very front end € curve or US Treasuries/MBS but hard to diversify

Impact on exchange rates: would official foreign holders re-value their currency vs. the Euro/amplify the exchange rate move?

What to purchase

Consensus view: Broad scope of assets including credit. The program would be large in size

Duration: Would the ECB need to buy across the curve to achieve its objective like other central banks or is it different ?

Exit

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