

## Follow the cash flow

### Trading strategies around supply, redemptions and coupon payments in Euro government bond markets

- We analyse the impact of supply via auction, and redemption and coupon payments on Euro area bond markets via cash-flow related systematic trading strategies
- We find evidence that pre-auction and post-auction trading strategies are successful with an average P&L per trade of 3.4bp and 1.5bp respectively (before transaction costs) since January 2010
- The bond market facing redemption and coupon payments typically outperforms cross-market in the subsequent days by a small amount (average P&L: 0.4bp)
- We analyse the robustness of the trading strategies by looking at optimal holding period, type of strategy, maturity bucket, country, year and size of the auction
- The optimal holding period is from T-5 to T-1 for the pre-auction strategy and from T-1 to T+4 for the post-auction strategy
- Hedging for intra-EMU spreads and Bund yields is more practical but increases P&L volatility and lowers information ratio
- Auction-cycle strategies work well across all maturity buckets; redemptions and coupon payments strategies have worked slightly better in the 10Y sector compared to 5Y
- These trading strategies deliver positive returns for most countries but Belgium shows the best results, followed by Spain
- Cash-flow related strategies performed best in the 2011-12 period, suggesting that poor liquidity market conditions played a significant role
- We found no clear relationship between trade P&L of cash-flow related strategies and the size of cash flow
- We also found no discernible relationship between auction statistics and the performance of the post-auction trading strategy

#### European Rates Strategy

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#### Summary performance statistics of tested cash-flow related strategies

	Pre-auction strategy (T-5 to T-1)	Post-auction strategy (T-1 to T+4)	Coupon & redemption strategy (T-1 to T+3)
# trades	1330	1342	344
Avg. P&L (bp)	3.4	1.5	0.4
Success ratio	67%	60%	51%
Information ratio (ann.)	2.5	1.1	0.6

Note:

- See Methodology section for details on the trading strategies.
- We define "T" as the auction date/coupon or redemption date.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

See page 10 for analyst certification and important disclosures.

## Follow the cash flow: Trading strategies around supply, redemptions and coupon payments in Euro government bond markets

In this note we analyse the impact of supply via auction, and redemption and coupon payments on Euro area bond markets via systematic trading strategies. We find that: 1) pre-auction and post-auction trading strategies are successful with an average P&L per trade of 3.4bp and 1.5bp respectively (before transaction costs), and IR ratio of 2.5 and 1.1, respectively, since 2010; 2) bond market facing redemption and coupon payments typically outperforms cross-market in the subsequent days by a small amount; 3) auction-cycle strategies work well across all maturity buckets; redemptions and coupon payments strategies have worked slightly better in the 10Y sector compared to 5Y; 4) at country level: Belgium shows the best results, followed by Spain; 5) cash-flow related strategies performed best in the 2011-12 period, suggesting that poor liquidity market conditions played a significant role; 6) we found no clear relationship between trade P&L of cash-flow related strategies and the size of cash flow and also found no discernible relationship between auction statistics and the performance of the post-auction trading strategy.

The piece is structured as follows:

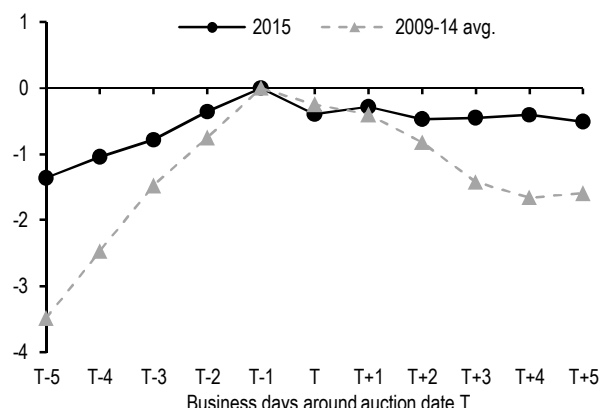
In the first section we examine trading strategies around supply, in the second section we cover the impact of bond redemptions and coupon payments and we conclude with a methodological section. Also in the attempt to isolate small predictable market inefficiencies we covered the month-end effect in other publications.<sup>1</sup>

## Trading strategies based on supply

As we have discussed in the past<sup>2</sup>, bonds typically tend to cheapen going into the auction and richen back after the auction (**Exhibit 1**). We find good evidence that **auction cycle-based trading strategies, both pre-auction and post-auction, have been profitable on average since 2010**.<sup>3</sup> Strategies capturing pre-auction cheapening dynamics have been in general more successful than those capturing post-auction richening dynamics.

### Exhibit 1: Bonds in the Euro area tend to cheapen into supply and richen back after the supply

Evolution of selected\* Euro area countries' bond spread to Germany\*\* around conventional auctions adjusted for intra-EMU spreads\*\*\*; 2009-3Q14 average; bp



\* Austria, Belgium, Finland, France, Germany, Italy, Netherlands and Spain. We exclude Ireland, Portugal and Greece from this analysis as Ireland and Portugal were under external aid-packages during most of the back-testing period and Greece is still under an external aid-package

\*\* If a new bond is issued, the bond with the closest shorter maturity is used. We exclude syndicate deals, exchanges, private placements.

\*\*\* (Bond yield – m/m German par yield) – Beta \* weighted Euro area countries maturity matched spread to Germany in the sector of the curve (weighted by the size of their outstanding bond market). The beta between the country spread to Germany and the weighted spread to Germany is calculated as the ratio of (Bond yield – m/m German par yield) and weighted Euro area countries maturity matched spread to Germany.

### Exhibit 2: Auction cycle-based trading strategies in the Euro area have been profitable on average over the past few years

Trade statistics of auction cycle-based trading strategies in the Euro area; by trade holding period

	Pre-auction			Post-auction		
	T-5 to T-1	T-4 to T-1	T-3 to T-1	T-1 to T+3	T-1 to T+4	T-1 to T+5
# trades	1330	1330	1330	1342	1342	1342
Avg. P&L (bp)	3.4	2.3	1.3	1.3	1.5	1.5
Success ratio	67%	63%	59%	60%	60%	60%
Inf. ratio (ann.)	2.5	2.2	1.7	1.0	1.1	0.9

Note:

- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.

- We define "T" as the auction date.

- We aggregate results for all the tested countries (simple average) to show Euro area level results.

We first test the optimal holding period for pre- and post-auction strategies (**Exhibit 2**). We test the hypothesis that the bond being auctioned in case of a tap or the current benchmark in case of a new bond auction, will underperform relative to the German equivalent once the general widening or tightening trend in EMU spreads is taken into account (see Methodology below for details)

<sup>1</sup> See [Month-end effect in the Euro area : it does exist but is not correlated with month-end duration extension](#), G. Salford et. al., 1 Aug 2014.

<sup>2</sup> See [Euro area government debt markets guide](#), G. Salford et. al., 8 October 2014.

<sup>3</sup> We start in January 2010 due to data availability constraints.

going into supply and that the relative underperformance will reverse after supply. We use close of business (COB) levels rather than auction levels due to the lack of information on the informal arrangement of offering discounts to investors for participation at the auctions.<sup>4</sup>

**The pre-auction trading strategy implemented over T-5 to T-1 period (entering a short in the bond being issued or the closest shorter maturity bond in case of new bond at T-5 COB and exiting at T-1 COB) gives the best results with a success ratio of almost 70%, an information ratio of 2.5, an average P&L (ex transaction cost) of 3.4bp over the testing horizon (more than 5.5 years) (Exhibit 3).** On the post-auction side, we find that the strategy implemented between T-1 to T+4 (entering at T-1 COB and exiting at T+4 COB) is the most attractive, although the difference compared to exiting at T+3 or T+5 is not large: for the T-1 to T+4 strategy the success ratio is 60%, the average P&L per trade 1.5bp and the information ratio is 1.1. The pre-auction strategy is therefore more attractive than the post-auction one; this is not surprising as the cheapening going into the auction has historically been more pronounced than the post-auction richening (Exhibit 1).

We use the T-5 to T-1 pre-auction trading strategy and the T-1 to T+4 post-auction trading strategy as default strategies for the rest of this section. We then test different versions of the auction trading strategies that are easier to implement. The information ratios and success rate of the pre- and post-auction strategies decline by a decent margin if the strategy is implemented on auctioned bonds' yield spread to Germany without any adjustment for intra-EMU spread trends (Exhibit 3). The pre-auction strategy performance declines further if the strategy is implemented on outright auctioned bond yield (no spread to Germany and any adjustment for intra-EMU spread trends). On the other hand the average P&L on the post-auction strategy is higher if implemented as an outright short pre-auction and as an outright long post-auction, however the information ratio is marginally lower than the adjusted strategy due to higher P&L volatility. The downward trend in the EMU yields explains the relatively worse performance of the pre-auction outright strategy (short into auction) and the relatively stronger performance of the post-auction outright strategy compared to adjusted strategies' performances. EMU sovereign yields have been, in general, drifting lower since 2010 with the EMU

<sup>4</sup> In general participation at the Euro area government bond auctions is only open to primary dealers. See [Euro area government debt markets guide](#), G. Salford et. al., 8 October 2014 for details.

**Exhibit 3: The information ratios and success rate of the pre- and post-auction strategies decline if other factors such as intra-EMU spread trends and German yield changes are not hedged**

Trade statistics of auction cycle-based trading strategies in the Euro area; by type of strategy

		# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
Pre-auction (T-5 to T-1)	vs. Germany, adjusted	1330	3.4	67%	2.5
	vs. Germany, non-adjusted	1330	2.6	59%	1.2
	Outright	1330	2.3	56%	1.1
Post-auction (T-1 to T+4)	vs. Germany, adjusted	1342	1.5	60%	1.1
	vs. Germany, non-adjusted	1342	1.9	57%	0.7
	Outright	1342	2.9	60%	1.0

Note:

- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.
- We define "T" as the auction date.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

**Exhibit 4: Looking at the adjusted strategy vs. Germany, pre-auction trading strategies performance is relatively better in 10Y and 10Y+ maturity buckets whereas on the post-auction side the strategy has performed relatively better in the 2Y sector but the differences are modest**

Trade statistics of auction cycle-based trading strategies in the Euro area; by maturity bucket

Maturity bucket	Pre-auction (T-5 to T-1)				Post-auction (T-1 to T+4)			
	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
2Y	275	3.9	68%	2.4	278	2.0	61%	1.3
5Y	420	3.7	66%	2.3	423	1.8	58%	1.1
10Y	360	3.0	66%	2.7	366	1.2	59%	1.0
10Y+	275	2.8	71%	2.7	275	1.2	61%	1.0
All	1330	3.4	67%	2.5	1342	1.5	60%	1.1

Note:

- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.
- We define "T" as the auction date.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

sovereign bond index yield declining from around 3.75% at the start of 2010 to the current level of around 1.30%.

How do auction strategies perform by maturity bucket? The Information ratios of pre-auction trading strategies are on average better in 10Y and 10Y+ maturity buckets, but the difference is modest (**Exhibit 4**). The 2-3Y sector has higher than average P&L of almost 4bp, however this is compensated by higher than average P&L volatility, resulting in a close to average information ratio. On the post-auction side, the strategy is slightly more attractive in the 2Y sector with higher P&L and information ratio.

#### Exhibit 5: The pre-auction trading strategy has fared well in all the countries with the exception of Finland over the testing horizon

Trade statistics of auction cycle-based trading strategy in the Euro area; by country

Country	Pre-auction (T-5 to T-1)				Post-auction (T-1 to T+4)			
	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
Austria	104	2.1	56%	2.1	104	1.0	61%	0.9
Belgium	127	4.0	68%	3.0	130	3.4	62%	1.8
Finland	23	0.3	52%	0.7	23	-0.6	65%	-0.6
France	369	2.3	73%	2.8	373	1.1	59%	1.4
Italy	298	4.3	67%	3.6	300	2.2	62%	1.4
Netherlands	110	0.9	59%	1.9	110	1.2	65%	1.9
Spain	299	5.1	67%	2.4	302	1.1	54%	0.6
Euro area	1330	3.4	67%	2.5	1342	1.5	60%	1.1

Note:

- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.
- We define "T" as the auction date.

**Exhibit 5** shows the performance of auction trading strategies by country. **Pre-auction trading strategies tend to work well in most countries with the exception of Finland (but the sample is fairly small) and the Netherlands** possibly because the preannouncement of the auction calendar on a quarterly basis causes a dilution of the relative underperformance over a longer period. On the post-auction side, the success rate is similar across countries, but the average P&L is negative in Finland; Belgium stands out with an impressive average P&L of more than 3bp over the strategy horizon.

We look at the performance of the auction-cycle strategies over time. **Exhibit 6** shows the performance of auction-cycle trading strategies since 2010. **The pre-auction trading strategy had a particularly good run between 2011 and 2012 when the Euro area markets were in the midst of peripheral sovereign crisis.** The performance of the strategy has been more modest muted since 2013 and especially in 2014 as the sovereign crisis abated. We highlight that the strong performance in 2011-12 is bit overstated as we are not incorporating any transaction costs in our analysis and during 2011-2012 transaction costs in Euro area sovereign bond markets increased significantly (**Exhibit 7**). P&L during 2011-2012 is about twice than the overall average, whereas transaction costs are proportionally much higher, thereby biting most of the extra upside. A similar, although less extreme, trend is also observed in post-auction trading strategy. Interestingly, data for the first eight months of 2015 shows a modest improvement in auction-cycle strategies.

#### Exhibit 6: Auction-cycle trading strategies showed the best performance in 2011 and 2012

Trade statistics of auction cycle-based trading strategies in the Euro area; by year

	Pre-auction (T-5 to T-1)				Post-auction (T-1 to T+4)			
	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
2010	213	2.7	70%	3.3	219	2.1	69%	1.8
2011	231	5.8	72%	3.4	233	3.1	60%	1.5
2012	274	7.2	75%	3.2	274	1.8	61%	0.9
2013	217	1.1	58%	1.9	217	1.4	57%	1.5
2014	218	0.5	60%	1.3	221	0.1	53%	0.2
2015*	177	1.3	65%	2.7	178	0.5	57%	0.8
All	1330	3.4	67%	2.5	1342	1.5	60%	1.1

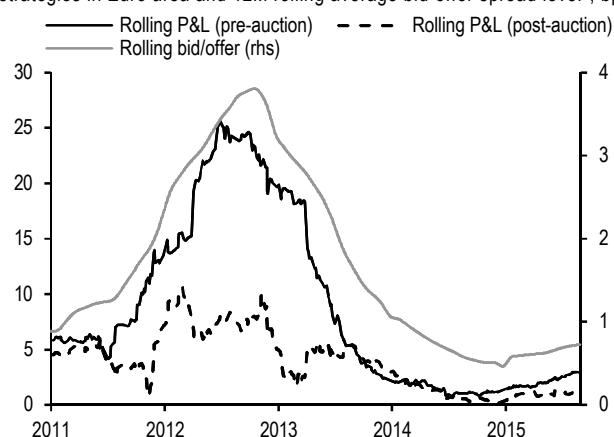
\* Until 31 August 2015.

Note:

- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.
- We define "T" as the auction date.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

#### Exhibit 7: The success of the auction-cycle trading strategies is positively correlated with bid-offer spreads

12M rolling cumulative P&L of pre- & post- auction cycle-based trading strategies in Euro area and 12M rolling average bid-offer spread level\*; bp



\* We use average bid-offer level on 10Y benchmark in France, Italy and Spain

Note:

- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.
- We define "T" as the auction date.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

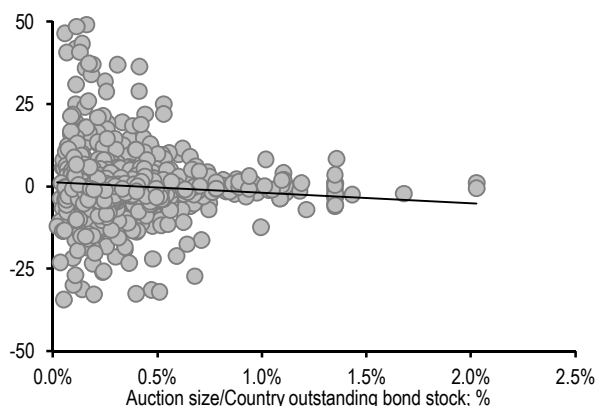
Source: Bloomberg and J.P. Morgan

We test whether the size of auctions has any impact on the performance of auction- trading strategies. Theoretically a compelling argument could be made that larger than usual auctions should have a larger impact. However, **empirically we find no clear relationship between trade P&L and auction size as % of country's outstanding bond stock for both pre-**



### Exhibit 8: Auction sizes do not have any discernible impact on the performance of the auction-cycle strategies

P&L of pre-auction trading strategy for Euro area between T-5 to T-1 trading period regressed against respective auction size as % of total outstanding bond stock and average bid-offer by country\*; bp



\* We create a bid-offer variable for each country tested. The variable value is average bid-offer level on the auction dates of a country and zero on all other dates (when there is auction in other countries)

Model: Avg. P&L =  $-317.1 \times \text{Auction size (\% of outstanding stock)} + 1.8 \times \text{Austria b/o} + 2.0 \times \text{Belgium b/o} + 1.4 \times \text{Finland b/o} + 0.9 \times \text{France b/o} + 2.1 \times \text{Italy b/o} + 0.4 \times \text{Netherlands b/o} + 2.1 \times \text{Spain b/o} + 1.3$ ; R-squared: 6.3%.

Note:

- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.

- We define "T" as the auction date.

- We aggregate results for all the tested countries (simple average) to show Euro area level results.

**auction (Exhibit 8)** and post-auction trading strategies even after controlling for market liquidity (bid-offer spread). We find similar results even if we use outright auction size instead of auction size as % of country's outstanding bond stock. We also fail to find a clear relationship looking at individual countries separately.

In a separate piece<sup>5</sup>, we highlighted that supply dynamics on average influence the Italy-Spain spread but recently the performance of the strategy of underweighting the country into supply worked better with a T-2 switch instead of T-1 (**Exhibit 9**). When we test the hypothesis of an auction cycle centered at T-2 instead of T-1 for all countries there is no significant improvement in the success ratio and P&L of the strategy. The information ratio of the T-5 to T-2 pre-auction trading strategy is higher relative to the T-5 to T-1 strategy (**Exhibit 10**).

<sup>5</sup> See [How elections and supply impact the Italy-Spain spread](#), 4 September 2015 for details.

### Exhibit 9: The trading strategy with switch at T-2 days before the auction in Italy and Spain has become attractive since 2014

Trade statistics of the auction-cycle trading strategy in Italy and Spain\*;

	Switch day	
	T-1	T-2
Total P&L since 2014 (bp)	66	164
Average P&L per trade (bp)	0.7	2.0
Inf. Ratio (ann.)	1.1	3.0
# of trades	76	76
Success ratio	58%	62%

\* Auction cycle trading strategy: Go short Italy vs. Spain if the next bond auction is in Italy and flip the trade (short Spain vs. Italy) if the following auction is in Spain at T-X days before the next auction. X = 1 and 2 days. We look at the performance of the J.P. Morgan EMU total return bond index -Italy and Spain 10Y benchmark sub-component to calculate the trade performance.

### Exhibit 10: In 2015, T-5 to T-2 pre-auction trading strategy performance has been stronger in terms of IR than T-5 to T-1 strategy

Trade statistics of auction cycle-based trading strategy in the Euro area;

		Pre-auction				Post-auction			
		# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
T-5 to T-1	2014	218	0.5	60%	1.3	218	0.1	53%	0.2
	2015*	177	1.3	65%	2.7	177	0.5	57%	0.8
T-5 to T-2	2014	218	0.4	55%	1.4	218	0.0	47%	0.0
	2015*	177	1.2	68%	3.9	177	0.5	56%	0.7

\* Until 31 August 2015.

Note:

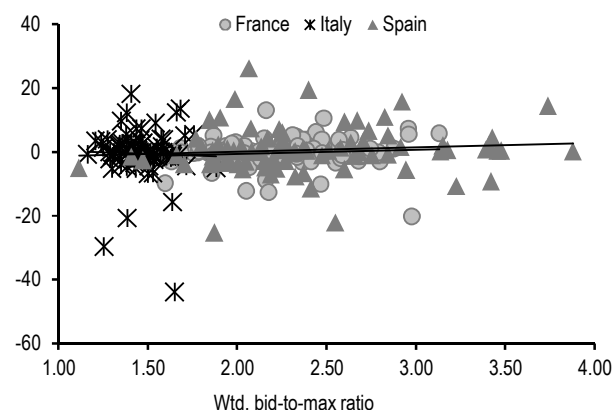
- See Methodology section of the Euro area supply trading strategy in the text for details on the trading strategy.

- We define "T" as the auction date.

- We aggregate results for all the tested countries (simple average) to show Euro area level results.

### Exhibit 11: Auction statistics do not explain post-auction performance

Average weighted\* P&L of the post-auction trading strategy regressed against respective auction weighted\* bid-to-max ratio and average bid-offer spread in France, Italy and Spain; bp



\* Weighting by auction sizes of different bonds tapped at an auction.

Models: France: Average weighted P&L =  $1.3 \times \text{bid-to-max} + 0.5 \times \text{bid-offer} - 3.2$ ; R-squared: 4%; Italy: Average weighted P&L =  $-2.1 \times \text{bid-to-max} + 1.2 \times \text{bid-offer} + 2.6$ ; R-squared: 3%; Spain: Average weighted P&L =  $1.3 \times \text{bid-to-max} - 0.2 \times \text{bid-offer} - 2.5$ ; R-squared: 1%.

### **Impact of auction statistics on post-auction performance**

We also test whether auction statistics have any impact on the performance of post-auction trading strategies. We find no clear relationship between auction statistics and the post-auction (T-1 to T+4) trading strategy performance in France, Italy and Spain. **Exhibit 11** shows the regression of post-auction strategy P&L against weighted (by auction sizes of different bonds tapped at an auction) bid-to-max ratios for auctions and average bid-offer spread in France, Italy and Spain. We get the same result on regressing post-auction strategy P&L against auction tails<sup>6</sup> and average bid-offer spread. We also highlight that in some of these regressions, the beta signs were non-intuitive and also most of the betas were statistically non-significant.

### **Trading strategies based on redemption and coupon payments**

**We find modest evidence of country outperformance around redemption and coupon payments (Exhibit 12).** We test the hypothesis that investors are more likely to reinvest the cash received from the issuer into the same market than in other markets: we track the performance of longs in the 5Y benchmark vs. Germany adjusted for the trend in intra-EMU spreads around redemptions and coupon payments.<sup>7</sup>

When we test the strategy for different holding periods we observe the following: 1) success ratios have been very similar over different holding periods, around 50-55%. 2) Information ratios range from around 0.4 to 1.1, with the best performance costs trading from T-1 to T. 3) These results seem quite encouraging but our enthusiasm is dampened by an average P&L per trade before transaction costs in the 0.2-0.4bp range. 4) The strategy implemented over four days (T-1 COB to T+3 COB) is the most attractive among all the horizons tested as it has the highest average P&L of 0.4bp with reasonable Information ratio and greater than 50% success ratio. We therefore use the T-1 to T+3 redemption and coupon trading strategy as the default strategy for the rest of this section.

In order to check the robustness of our findings we test the performance using 10Y spreads instead of 5Y, without correcting for the trends in intra-EMU spreads and also on outright country yield performance instead of

<sup>6</sup> Auction tail defined as the difference between marginal auction yield (highest accepted yield) and average auction yield.

<sup>7</sup> The only difference compared to the auction-cycle strategies discussed above is that we analyse the impact of redemptions and coupon payments on an arbitrary sector of the curve.

### **Exhibit 12: There is some modest evidence of market outperformance around redemption and coupon payments in the Euro area markets**

Trade statistics of redemption and coupon trading strategy in the Euro area; by trade holding period

	T-2 to T	T-1 to T	T-1 to T+1	T-1 to T+2	T-1 to T+3
# trades	344	344	344	344	344
Avg. P&L (bp)	0.1	0.2	0.2	0.3	0.4
Success ratio	54%	53%	53%	53%	51%
Inf. ratio (ann.)	0.4	1.1	0.5	0.5	0.6

Note:

- See Methodology section of the redemption and coupon trading strategy in the text for details on the trading strategy.
- We define "T" as the redemption and coupon date on a trade date basis.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

### **Exhibit 13: The redemption and coupon trading strategy results are broadly similar when implemented on 5Y spreads and 10Y spreads adjusted for market trend; the better performance of the outright strategy is due to the downward trend in yields over the past few years**

Trade statistics of redemption and coupon trading strategies in Euro area; T-1 to T+3 period; by type of strategy

		# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
5Y	vs. Germany, adjusted	344	0.4	51%	0.61
	vs. Germany, non-adjusted	344	1.1	52%	0.57
	Outright	344	1.4	56%	0.81
10Y	vs. Germany, adjusted	344	0.5	59%	0.84
	vs. Germany, non-adjusted	344	0.4	54%	0.28
	Outright	344	0.8	57%	0.54

Note:

- See Methodology section of the redemption and coupon trading strategy in the text for details on the trading strategy.
- We define "T" as the redemption and coupon date on a trade date basis.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

spread to Germany performance. The strategy results are broadly similar when implemented on 5Y spreads and 10Y spreads adjusted for market trend (cleaning for market trends), with strategy on 10Y faring marginally better (**Exhibit 13**). As expected strategies implemented on outright spreads (curve adjusted spread to Germany without cleaning for market trend) deliver worse information ratios compared to the original version due to the noise introduced by not correcting for general intra-EMU widening dynamics. The performance of the strategy implemented as an outright long delivers the highest P&L and success ratio. This, however, should not be surprising, as the performance of the outright strategy has benefitted from the downward trend in the EMU yields over the past few years.

**Exhibit 14** shows the performance of the trading strategy at country level, keeping in mind that some countries

#### Exhibit 14: At country level, redemption and coupon trading strategies in Belgium and Spain are the most attractive

Trade statistics of redemption and coupon trading strategies in Euro area; T-1 to T+3 period; by country

Country	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
Austria	52	0.2	48%	0.4
Belgium	21	2.4	76%	3.0
Finland	20	-0.4	40%	-1.0
France	51	0.9	57%	1.7
Italy	153	-0.2	47%	-0.2
Netherlands	16	1.2	63%	3.5
Spain	31	1.8	52%	1.9
Euro area	344	0.4	51%	0.6

Note:

- See Methodology section of the redemption and coupon trading strategy in the text for details on the trading strategy.
- We define "T" as the redemption and coupon date on a trade date basis.

might suffer from small sample issues. **Belgium stands out with the highest success ratio, average P&L and second highest information ratio among the tested countries** (matching the good performance of auction-based strategies, see above). Interestingly, Italy has marginally negative average P&L and poor success ratio due to the fact that the trade date of redemptions and coupon payments typically coincides with supply and the auction cycle has a more powerful impact. Among the largest countries, we also highlight Spain's attractive average P&L of almost 2bp.

**Exhibit 15** shows the performance of the T-1 to T+3 redemption and coupon trading strategy on 5Y and 10Y spreads over time. The strategy performed well in the 2011-13 when the Euro area markets were in the midst of the peripheral sovereign crisis, in line with the auction cycle trading strategy. The performance has been modest 2013 and 2014 as the sovereign crisis abated. Interestingly, data for the first eight months of 2015 shows a modest improvement in the performance of redemption and coupon trading strategy, similar to the auction-trading strategy. It is worth highlighting that the performance in 2012 is overstated as we are not incorporating any transaction costs in our analysis and during 2011-2012 transaction costs in Euro area sovereign bond markets increased significantly if we use Bloomberg bid-offer spread data as a proxy (**Exhibit 16**). Over the past few years the strategy on 10Y spreads have performed relatively better compared to the strategy on 5Y spreads, possibly reflect the constraint posed by very low yields in the 5Y sector.

#### Exhibit 15: The performance of the redemption and coupon trading strategy was better during the peripheral sovereign crisis period

Trade statistics of redemption and coupon trading strategies in Euro area; T-1 to T+3 period; by year

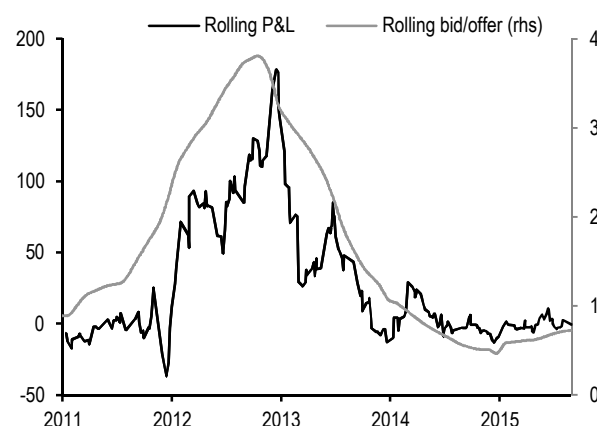
	5Y				10Y			
	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)	# trades	Avg. P&L (bp)	Success ratio	Inf. ratio (ann.)
2010	52	-0.2	56%	-0.5	52	0.1	60%	0.2
2011	50	0.3	56%	0.3	50	0.5	64%	0.5
2012	56	2.5	59%	2.4	56	1.8	64%	2.0
2013	64	0.1	42%	0.2	64	0.4	55%	0.9
2014	72	-0.1	44%	-0.5	72	0.0	57%	0.0
2015*	50	0.2	54%	1.0	50	0.4	54%	1.2
All	344	0.4	51%	0.6	344	0.5	59%	0.8

Note:

- See Methodology section of the redemption and coupon trading strategy in the text for details on the trading strategy.
- We define "T" as the redemption and coupon date on a trade date basis.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

#### Exhibit 16: Strategies based on redemptions and coupon payments have worked best at times of market stress

12M rolling P&L of redemption and coupon trading strategy between T-1 to T+3 period in Euro area on 5Y vs. 12M rolling average bid-offer on 10Y benchmark bond\*; bp



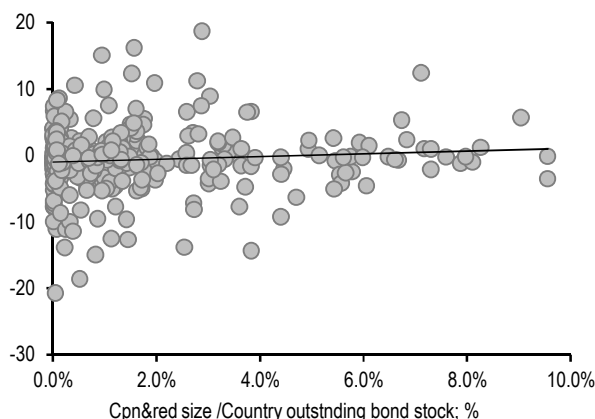
\* Simple average of France, Italy and Spain

Source: Bloomberg and J.P. Morgan

Theoretically the size of the redemption or coupon payment (as % of bond market outstanding or expressed in €bn) should be positively correlated with the market impact. However when we tested whether the size of payments matter, we found no clear relationship between the strategy performance and coupon/redemption sizes as % of country's outstanding bond stock (**Exhibit 17**) or with payments expressed in €bn, even after adjusting for bid-offer spreads. We do not find a clear relationship at individual country level either.

### Exhibit 17: Coupon/redemption size does not matter

P&L of redemption and coupon trading strategy between T-1 to T+3 period regressed against respective coupon/redemption payment size as % of total outstanding bond stock and average bid-offer by country\*; bp



\* We create a bid-offer variable for each country tested. The variable value is average bid-offer level on the auction dates of a country and zero on all other dates (when there is auction in other countries)

Model: Avg. P&L = 21.2\* Coupon/redemption payment size (% of outstanding stock) + 0.5\*Austria b/o + 2.2\*Belgium b/o + 0.03\*Finland b/o + 0.9\*France b/o + 0.3\*Italy b/o + 0.7\*Netherlands b/o + 2.2\*Spain b/o - 1.0; R-squared: 9.8%.

Note:

- See Methodology section of the Redemption and coupon trading strategy in the text for details on the trading strategy.
- We define "T" as the redemption and coupon date on a trade date basis.
- We aggregate results for all the tested countries (simple average) to show Euro area level results.

## Methodology section: auction-cycle trading strategy

We track the performance of an auctioned bond's adjusted yield spread<sup>8</sup> to Germany around the auction. If a new bond is issued, the bond with the closest shorter maturity is used instead. Syndicated deals and private placements are excluded. Only conventional bonds are included in the analysis, but we assume that the results would hold for inflation-linked bonds as well. In the standard strategy the adjusted yield spread to Germany is calculated as (Bond yield - maturity-matched German par yield) - Beta \* weighted Euro area countries maturity matched spread to Germany in the sector of the curve (weighted by the size of their outstanding bond market). The beta<sup>9</sup> is calculated as the ratio of (Bond yield - m/m German par yield) and weighted Euro area countries maturity matched spread to Germany. We beta adjust the

<sup>8</sup> Adjusted for maturity mismatch by taking the difference in maturity-matched swap spreads.

<sup>9</sup> The beta is not a regression beta but the ratio of (Bond yield - m/m German par yield) and weighted Euro area countries maturity matched spread to Germany

spread to Germany in order to isolate the impact of auction-cycle.

In the pre-auction trading strategy, the P&L will be positive (negative) if the adjusted spread widens (narrows), as we expect the auctioned bond to underperform relative to other bonds in the sector. In the post-auction trading strategy, the P&L will be positive (negative) if the adjusted spread narrows (widens), as we expect the auctioned bond to outperform relative to other bonds in the sector.

We define "T" as the auction date. For instance in the T-5 to T-1 pre-auction strategy, we enter the trade at the closing level on T-5 and exit the trade at the closing level on T-1.

We back-test the strategy for all conventional bond auctions between 1 January 2010 and 31 August 2015 for the following Euro area countries: Austria, Belgium, Finland, France, Italy, Netherlands and Spain. We exclude Ireland, Portugal and Greece from this analysis as Ireland and Portugal were under external aid-packages during most of the back-testing period and Greece is still under an aid-package. All the results are shown before transaction costs.

## Methodology section: redemption and coupon trading strategy

We analyse the performance of 5Y curve-adjusted spread<sup>10</sup> to Germany adjusted for intra-EMU trends, around the redemption and coupon dates of conventional bonds in a country. In the standard strategy the 5Y curve-adjusted spread to Germany adjusted for intra-EMU trends is defined as: (5Y country ASW - 5Y Germany ASW) - Beta \* weighted Euro area countries maturity matched spread to Germany (weighted by the size of their outstanding bond market). The beta<sup>11</sup> is calculated as the ratio of (5Y country ASW - 5Y Germany ASW) spread and weighted Euro area countries maturity matched spread to Germany on that day.

We define "T" as the redemption and coupon date on a trade date basis.<sup>12</sup> In the T-1 to T+3 strategy, we enter the trade at the closing level on T-1 (day before redemption

<sup>10</sup> Adjusted for maturity mismatch by taking the difference in maturity-matched swap spreads.

<sup>11</sup> See footnote 9.

<sup>12</sup> Redemption and coupon date on a trade date basis is the date on which executing a trade in that country will settle as the same day as of redemption and coupon payment date. The reasoning behind using trade date is that investors can trade on this date and use the redemption and coupon payment received on the payment day to settle the trade.



and coupon date) and exit the trade at the closing level on T+3.

The P&L will be positive (negative) if the adjusted spread narrows (widens), as we expect the auctioned bond to outperform relative to other bonds in the sector.

We back-test the strategy for redemption and coupon payment dates between 1 January 2010 and 31 August 2015 for conventional, inflation-linked, zero-coupon and floater bonds for the following Euro area countries: Austria, Belgium, Finland, France, Germany, Italy, Netherlands and Spain. We exclude Ireland, Portugal and Greece from this analysis as Ireland and Portugal were under external aid-packages for a large part of the back-testing period and Greece is still under an external aid-package. All the results are shown before transaction costs.

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