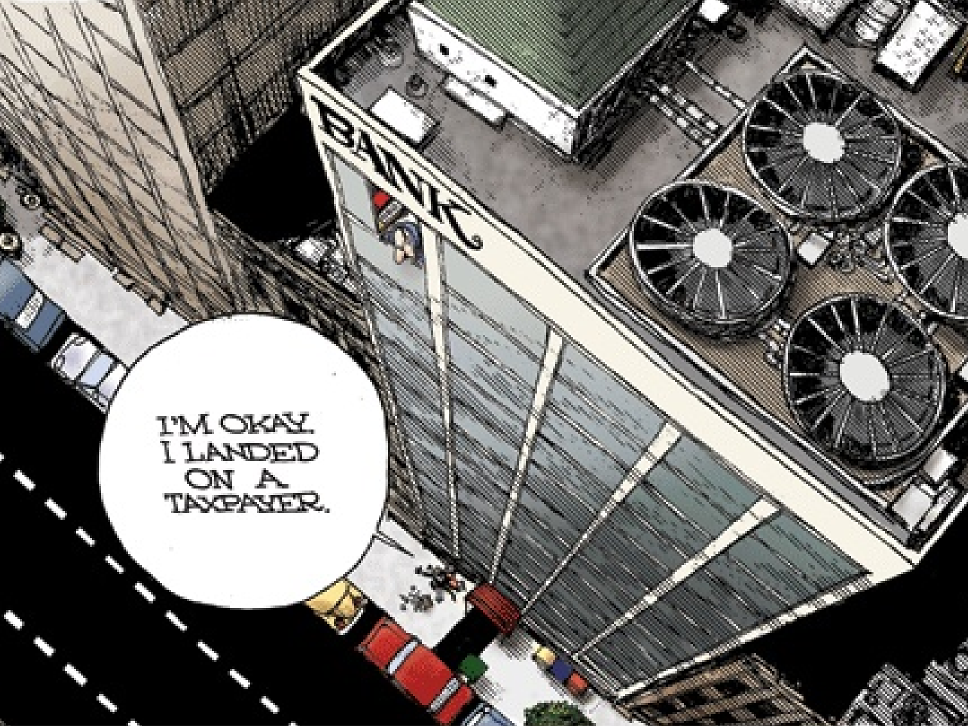
I'M OKAY. I LANDED ON A TAXPAYER.
BANK

Clearing & Settlement

September 11, 2014 12:18 am

JPMorgan tells clearers to build bigger buffers

By Sam Fleming and Philip Stafford

Clearing houses – which guarantee the smooth completion of financial transactions ranging from derivatives trades to commodities deals – should be required to line up larger financial buffers to prevent triggering a future market disaster, a top investment bank has argued.

JPMorgan Chase is to warn in a forthcoming paper that the current system for dealing with failing clearing houses is brittle and opaque, and requires a new resolution framework to tackle major failures.

The bank's proposal – which it has been showing to leading regulators and central banks – calls for the banks and brokers that use central counterparties, as well as the clearing houses themselves, to contribute to a fund that could be used to bolster a failing CCP. It also calls on regulators to create a standardised stress-testing regime to gauge CCP resilience.

Markets forecast - stress tests and QE

Temperature of financial markets

China demand worries corroding copper price

Systemic Risk in Central Clearing: Should Crowded Trades Be Avoided?

Albert J. Menkveld

VU University Amsterdam and Tinbergen Institute

August 20, 2016

Motivation

ESRB annual report 2012, p. 16:

> *Structural reforms being promoted across the globe have paved the way for improved risk management throughout the financial system. In particular, the mandatory move to clearing standardised over-the-counter (OTC) derivatives trades via CCPs will help to reduce counterparty risk between financial institutions, . . .*

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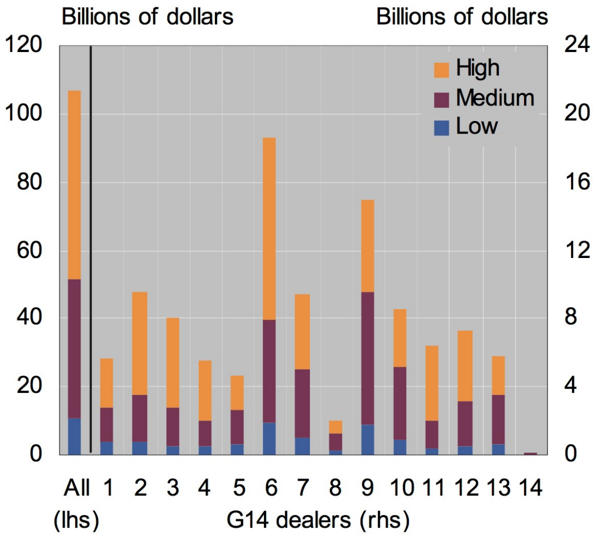
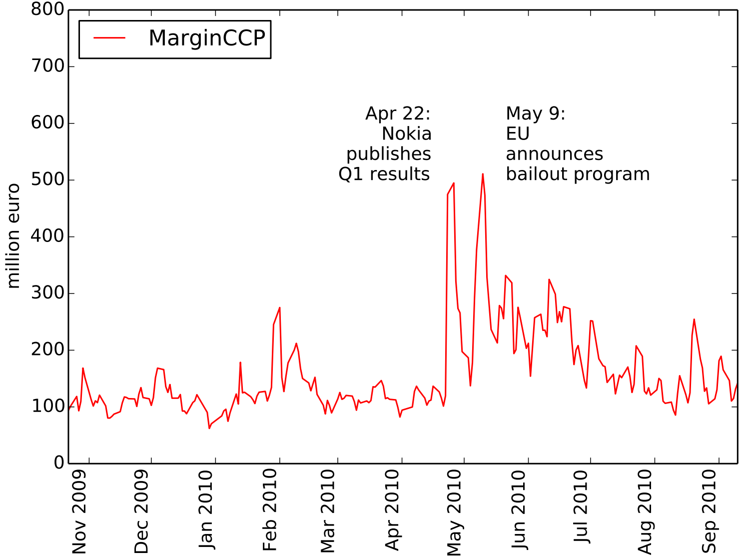
>
> *However, the more prominent role of CCPs will also introduce new systemic risks. Mandatory clearing will turn CCPs into systemic nodes in the financial system, with unknown, but possibly far-reaching, consequences.*

Initial margin requirements G14 CDS portfolios



Source: Heller and Vause (2012, Graph 11)

CCP underinsurance due to crowded trades?



Source: Menkveld (2014)

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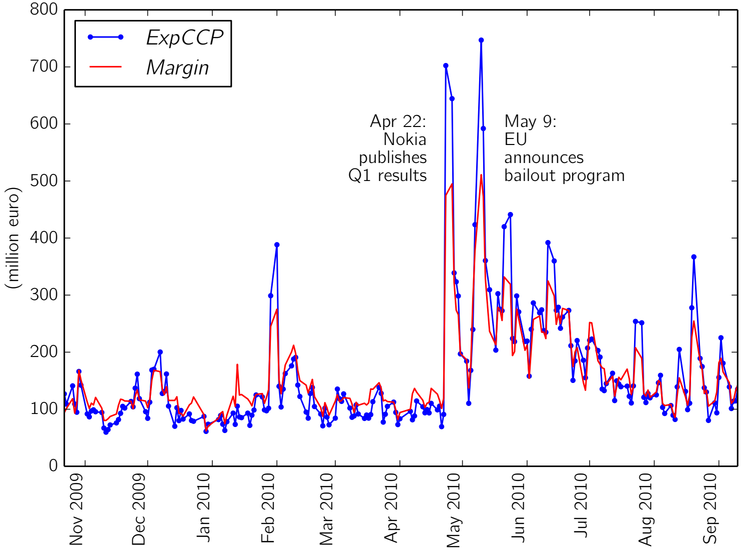

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Findings

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2. Fire sales cannot be avoided in equilibrium; the size of the default fund is endogenous and should depend on the size of fire sales.
3. An increase in the fraction of intermediaries who become arbitrageurs (and not standby investors) leads to *lower* overall investment in arbitrage opportunities.

Literature

1. **CCP vs. OTC**
   Duffie and Zhu (2011), Koeppl, Monnet, and Temzelides (2012), Menkveld, Pagnotta, and Zoican (2015)
2. **Counterparty risk monitoring**
   Biais, Heider, and Hoerova (2011), Acharya and Bisin (2011), Koeppl (2013)
3. **Systemic risk in trades**
   Basak and Shapiro (2001), Acharya (2009), Farhi and Tirole (2012)
4. **CCP risk management**
   Hedegaard (2012), Jones and Pérignon (2013), Cruz Lopez et al. (2016), Menkveld (2014)
5. **Crowded trades**
   Khandani and Lo (2007), Khandani and Lo (2011), Pojarliev and Levich (2011)

Model

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3. Allen and Gale (1994): limited-participation model with cash-in-the-market pricing.

Primitives

1. **Investment opportunities.** Two "orthogonal" identical arbitrage opportunities are available with payoff ($\alpha > 0$):

$$R = \begin{cases} 1 + \frac{\frac{1}{2}\pi + \alpha}{1-\pi} & \text{with probability } 1 - \pi \qquad \text{(H)} \\ \frac{1}{2} & \text{with probability } \pi \qquad \text{(L)} \end{cases}$$

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    4.2 The level of credit is fixed *ex-ante* and margin therefore is fixed at a pre-specified level $m < 1/2$.

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   3.4 Agents consume final wealth.

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   1.1 Fix the proportion of arbitrageurs at exogenous value φ. Analyze the outcome for different levels of crowdedness (γ).
   1.2 Endogenize φ by equating the expected return for arbitrageurs and standby investors.

Equilibrium (φ exogenous)

Proposition 1

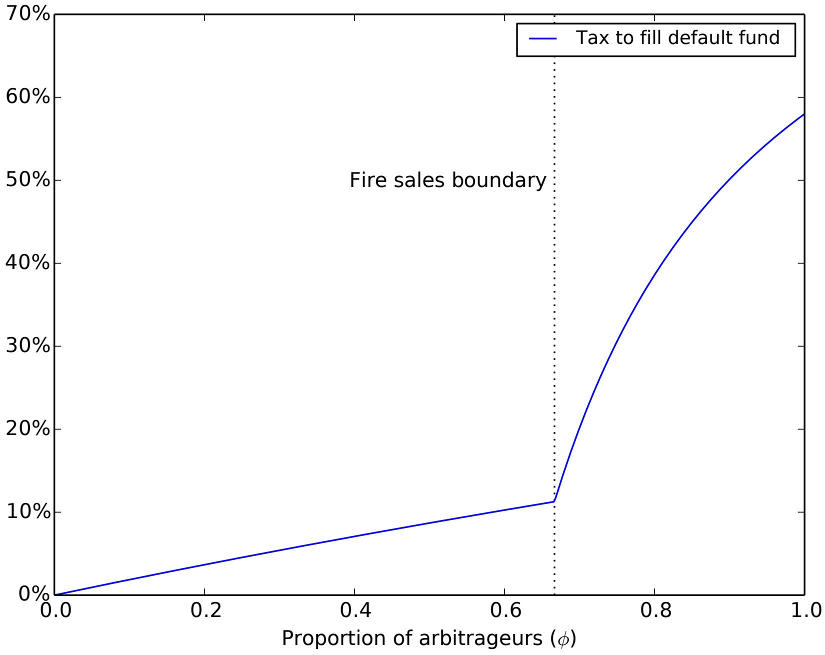
1. *(Arbitrageurs benefit from limited liability)* Arbitrageurs invest into a single arbitrage opportunity. They default if their opportunity hits the low payoff state ("risk shifting").

Default fund size

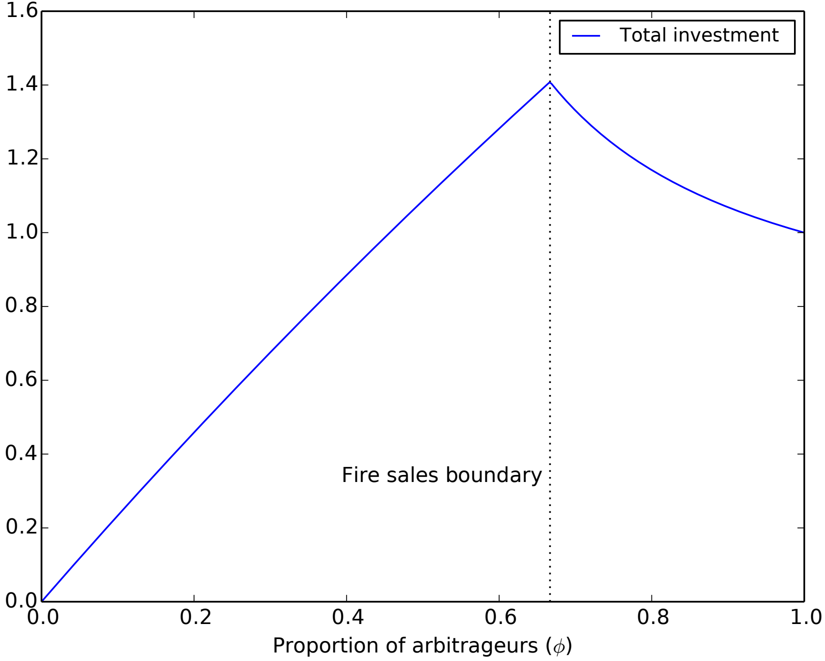
1. Default fund size depends on φ (not γ):

$$c_\varphi \geq \underbrace{x\left(\frac{1}{2} - m\right)}_{\text{Net trade loss}} + \underbrace{x \max\left(0, \frac{1}{2} - \frac{1-\varphi}{\varphi}\right)}_{\text{Potential fire sales}},$$

where $x = \varphi\left(\frac{1-c_\varphi}{m}\right)$ is the total amount invested by arbitrageurs.



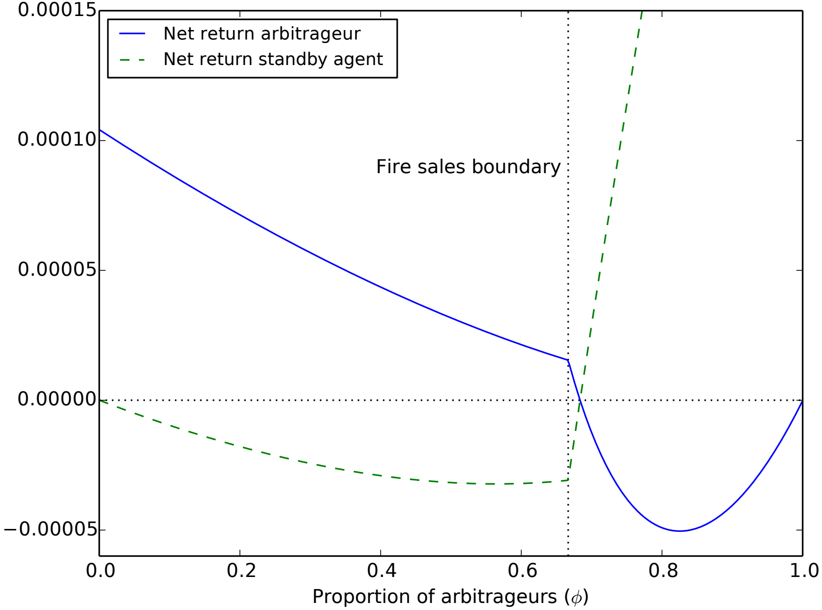
70%
60%
50%
40%
30%
20%
10%
0%
0.0
0.2
0.4
0.6
0.8
1.0
Proportion of arbitrageurs (ϕ)
Tax to fill default fund
Fire sales boundary



Total investment
Fire sales boundary
Proportion of arbitrageurs (ϕ)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

Equilibrium (φ endogenous)

Expected return intermediaries ($\alpha = 0, \gamma = 1/2$)



Proposition 2

1. *(Existence and uniqueness)* For each value of trade crowdedness γ, there is a unique value of φ (fraction of arbitrageurs) for which the expected return of an arbitrageur equals that of a standby investor.

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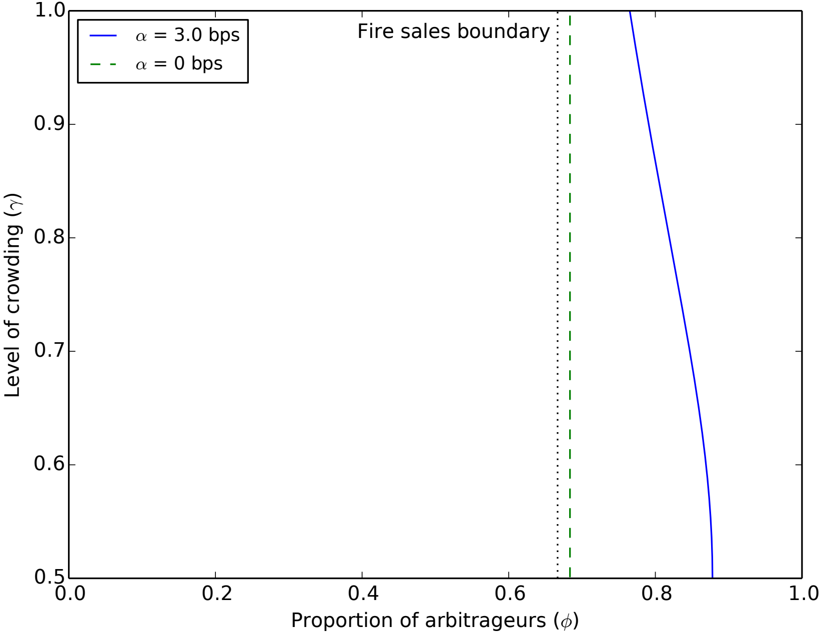
   Pf.: Difference in expected net return monotone in φ.

Equilibrium φ as function of γ



Corollary 2

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   1.1 Fire sale risk exists in equilibrium.
   1.2 A higher return on arbitrage opportunities increases the proportion of arbitrageurs and therefore lowers overall investment.
   1.3 More crowding reduces the proportion of arbitrageurs and therefore increases overall investment.

Proposition 3 (CAPM-like result)

1. *(Survival risk premium)* Expected return depends on how relative survival of the agent's type correlates with aggregate loss:

$$\beta * \lambda,$$

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$$\beta * \lambda,$$

λ is the market premium of survival:

$$\lambda = \varphi \times \tilde{c} \times \text{var}(l) =$$

$=$ fraction arbitrageurs $\times$
net default fund contribution when arbitrageur fails $\times$
aggregate loss risk.

Welfare

Welfare

1. Grossman and Miller (1988) type end-users are introduced. The demand curve of early sellers is assumed to be iso-elastic:

$$p = \frac{\theta}{q^{1/\eta}},$$

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2. WLOG late buyers are assumed to be perfectly price-elastic ($\eta = \infty$).
3. The two arbitrage opportunities correspond to two orthogonal markets for immediacy, i.e., the groups of outside-customer buyers and sellers do not overlap.

Effect of crowdedness on welfare

1. The effect of a small change to diversity $(d\gamma)$ on welfare is:

$$\mathrm{d}W(\varphi,\gamma) = \underbrace{W_{22}(\mathrm{d}\gamma)^2}_{\text{“Direct” effect}} + \underbrace{W_{11}\frac{\partial^2\varphi}{(\partial\gamma)^2}(\mathrm{d}\gamma)^2}_{\text{“Indirect” effect}} + O\left((\mathrm{d}\gamma)^3\right)$$

Proposition 4

1. The second-order Taylor expansion for welfare change is:

$$dW(\varphi,\gamma) = \overbrace{W_{22}(d\gamma)^2}^{\text{"Direct" effect}} + \overbrace{W_1 \frac{\partial^2 \varphi}{(\partial\gamma)^2}(d\gamma)^2}^{\text{"Indirect" effect}} + O\left((d\gamma)^3\right), \tag{1}$$

where W_{ij} denotes a partial derivative of the function W to its i^{th} and j^{th} argument respectively.

Proposition 5

1. *(Direct)* The direct channel implies that welfare is weakly reduced if there is more crowding in trade, i.e., a higher γ. If demand is perfectly elastic then there is no reduction, in all other cases there is a strict reduction.

Proposition 6

1. *(Indirect effect, default fund channel)* More crowdedness in trade reduces the proportion of arbitrageurs and therefore overall investment.

Proposition 7

1. *(Indirect effect, alpha channel)* More crowdedness in trade changes α and therefore the proportion of arbitrageurs.

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   1.1 α remains unchanged when demand elasticity is one ($\eta = 1$),
   1.2 α increases when demand is inelastic ($\eta < 1$),
   1.3 α decreases when demand is elastic ($\eta > 1$).

Proposition 8

1. *(Welfare and perfect diversity)* The effect on welfare of more crowding cannot be signed.

Calibration

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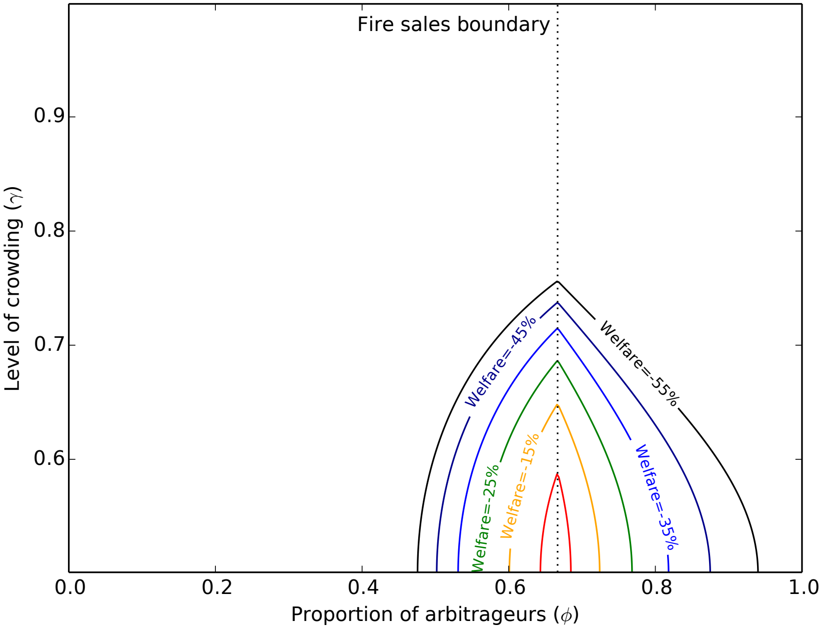
2. Price elasticity of demand is $\eta = 0.5$ or $\eta = 5$.
3. Scaling parameter θ in demand function such that equilibrium return on perfect diversity is $\alpha_\theta = 0.0003$ ($\sim$ bid-ask spread).
4. the required margin is $m = 0.42$ ($\sim 7\sigma$ as in EMCF CoH).

Inelastic liquidity demand ($\eta = 0.5$)



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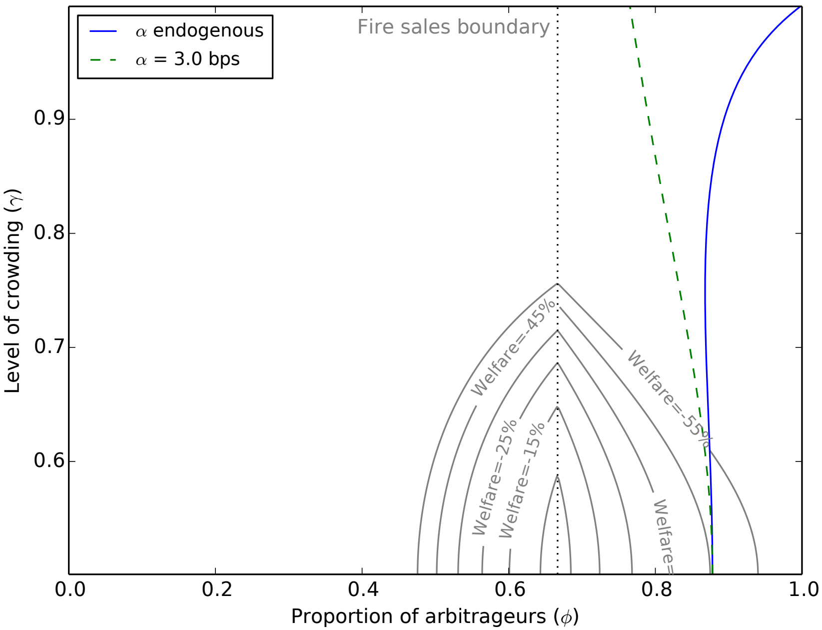
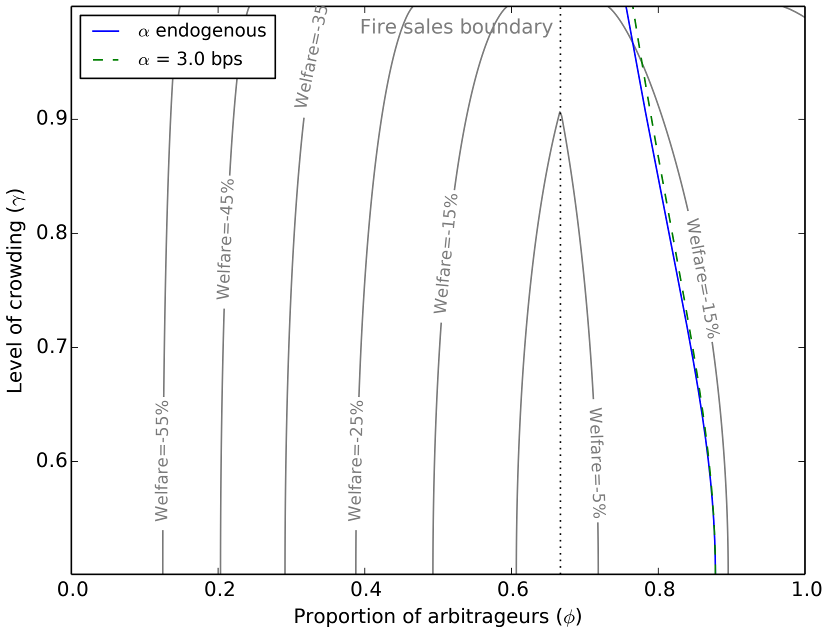


Elastic liquidity demand ($\eta = 5$)



Effect of crowdedness on welfare

Demand elasticity	Welfare effect of small change away from perfect diversity				
	Direct	Indirect, through change default fund return	Indirect, through change in arbitrage return	Indirect, total	Total, direct + indirect
Low, 0.5					
High, 5					

Effect of crowdedness on welfare

Demand elasticity	Welfare effect of small change away from perfect diversity				
	Direct	Indirect, through change default fund return	Indirect, through change in arbitrage return	Indirect, total	Total, direct + indirect
Low, 0.5	-1598				
High, 5	-40				

Effect of crowdedness on welfare

Demand elasticity	Welfare effect of small change away from perfect diversity				
	Direct	Indirect, through change default fund return	Indirect, through change in arbitrage return	Indirect, total	Total, direct + indirect
Low, 0.5	-1598	412			
High, 5	-40	77			

Effect of crowdedness on welfare

Demand elasticity	Welfare effect of small change away from perfect diversity				
	Direct	Indirect, through change default fund return	Indirect, through change in arbitrage return	Indirect, total	Total, direct + indirect
Low, 0.5	-1598	412	-296		
High, 5	-40	77	4		

Effect of crowdedness on welfare

Demand elasticity	Welfare effect of small change away from perfect diversity				
	Direct	Indirect, through change default fund return	Indirect, through change in arbitrage return	Indirect, total	Total, direct + indirect
Low, 0.5	-1598	412	-296	116	
High, 5	-40	77	4	81	

Effect of crowdedness on welfare

Demand elasticity	Welfare effect of small change away from perfect diversity				
	Direct	Indirect, through change default fund return	Indirect, through change in arbitrage return	Indirect, total	Total, direct + indirect
Low, 0.5	-1598	412	-296	116	-1483
High, 5	-40	77	4	81	42

Concluding remarks

1. Perfect diversity in investment is not necessarily socially optimal, in particular when demand for immediacy is elastic (Hollifield et al., 2006, JF: $e_p^q \sim 10$).

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Concluding remarks

1. Perfect diversity in investment is not necessarily socially optimal, in particular when demand for immediacy is elastic (Hollifield et al., 2006, JF: $e_p^q \sim 10$).
2. Size default fund depends on the level of crowding.
3. Upgrade to CCP risk management 2.0?

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