Assessing the consequences of the technical default of a bank in the French private LVPS PNS

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Assessing the consequences of the technical default of a bank in the French private LVPS PNS

I. Presentation of PNS and methodology

II. Functioning of PNS without defaulter

III. Impact of a default when no selective modification of limits by the other participants

IV. Impact of a default when selective modification of limits by the other participants

V. Conclusion

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Assessing the consequences of the technical default of a bank in the French private LVPS PNS

I. Presentation of PNS and methodology

- Principal caracteristics of the design of PNS
- Methodology used

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Assessing the consequences of the technical default of a bank in the French private LVPS PNS

I. Presentation of PNS and methodology

- **Main caracteristics of the design of PNS**
  - Privately owned large value payment system
  - Payments are processed one by one and settled continuously with immediate finality in central bank money
  - Real time link between TBF (RTGS connected to TARGET) and PNS to transfer liquidity
    - one initial transfer from TBF to PNS at the beginning of the day
    - additional transfers to and from TBF throughout the day
  - Bilateral limits set by the issuer

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I. Presentation of PNS and methodology

- **Main caracteristics of the design of PNS**
  - Payments not settled immediatedly are queued centrally
  - Settlement mechanism for queued payments :
    - Queue scanning : when a payment is settled
    - Bilateral offsetting : when a payment is queued
    - Multilateral offsetting : periodically
  - Bypass FIFO mechanism for payments under 1 M €

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Assessing the consequences of the technical default of a bank in the French private LVPS PNS

I. Presentation of PNS and methodology

- Main caracteristics of the design of PNS
- Methodology used
  - Over 1,200 simulations
  - 20 days of actual transaction data from January 2004
  - Technical default :
    . No payments issued …
    . … but payments received

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Assessing the consequences of the technical default of a bank in the French private LVPS PNS

I. Presentation of PNS and methodology

- Main caracteristics of the design of PNS
- Methodology used
  - Indicators :

    . Rejected payments

    . Delay indicator : $$\delta = \frac{\sum_i (t_{settle,i} - t_{issue,i}) v_i}{\sum_i (t_{end,i} - t_{issue,i}) v_i}$$

    . Percentage of payments settled immediately, average time spent in the queue, ...

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II. Functioning of PNS without defaulter

- Model
- Principal results

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- **II. Functioning of PNS without defaulter**

- **Model**
  - **Lower Bound of Liquidity (LBL) : minimum level of liquidity necessary to settle all payments**
  - **Lower Bound of Bilateral Limits (LBBL) : minimum value of bilateral limits necessary to settle all payments**
  - **Simulations were realised with different levels of liquidity (LL) and bilateral limits (BLL) :**

$$LL = LBL + \alpha\,(AL - LBL) \quad \alpha \in [\,0\,,\,1\,]$$

$$BLL = LBBL + \beta\,(ABL - LBBL) \quad \beta \in [\,0\,,\,\infty\,[$$

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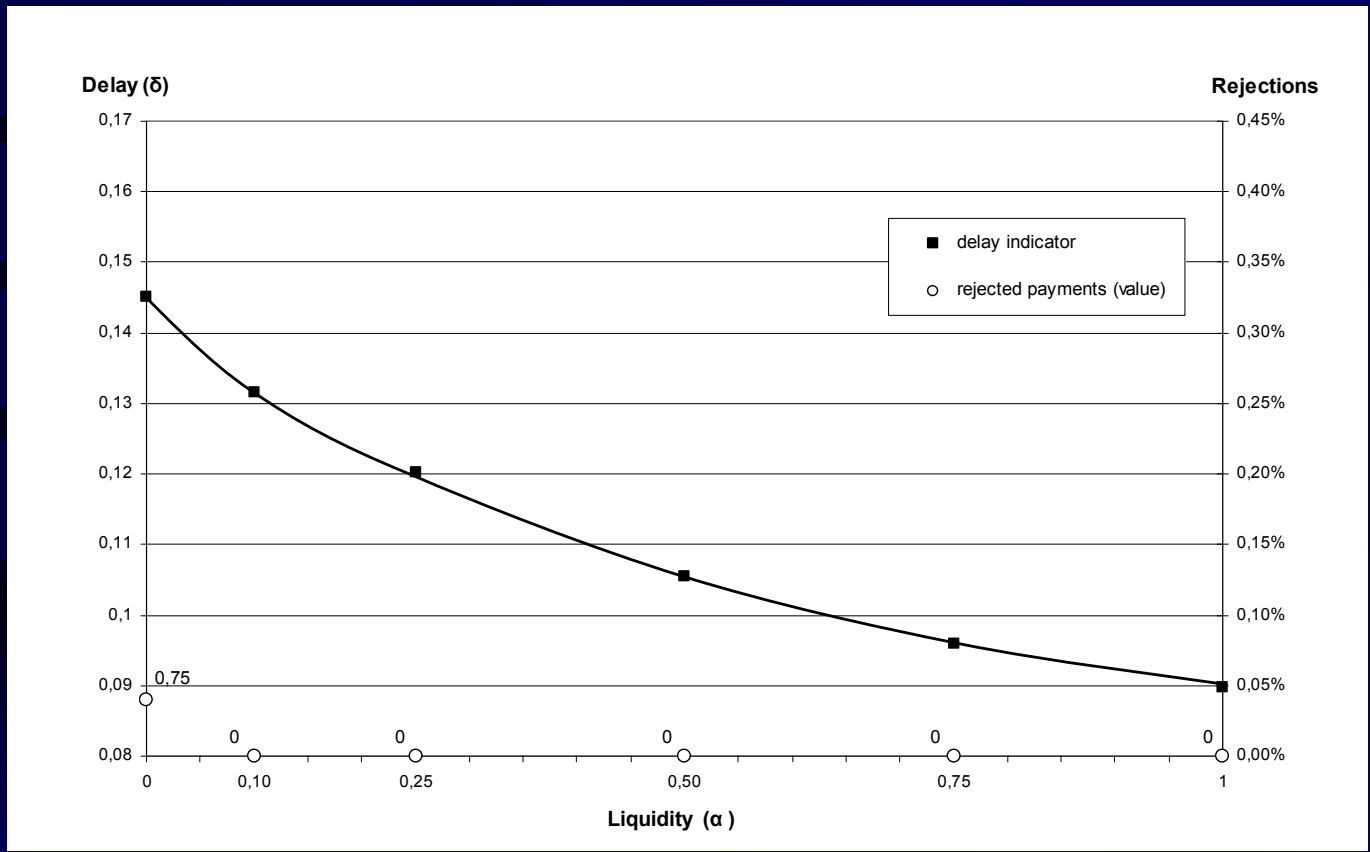
$$\delta = f(\alpha)$$



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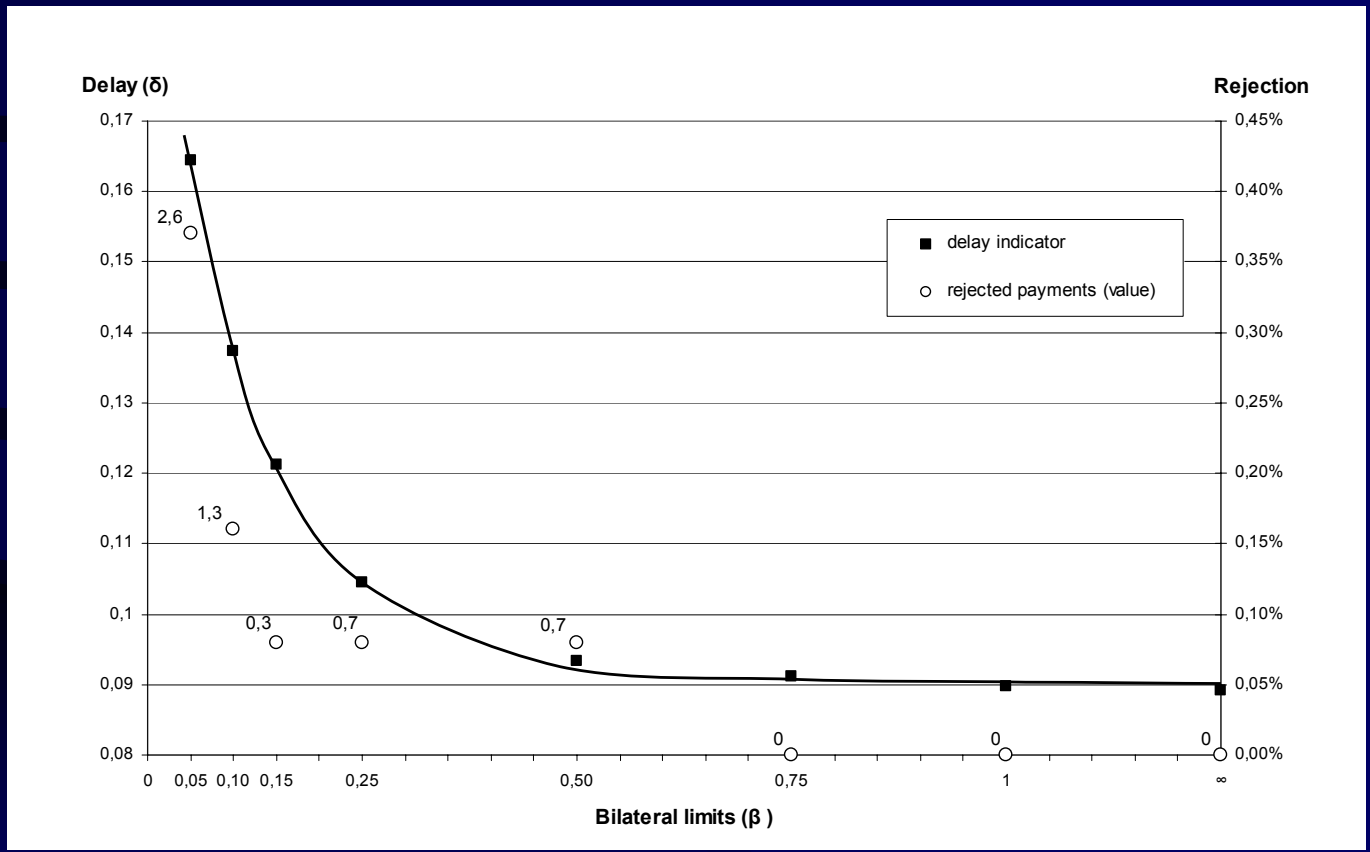
$$\delta = f(\beta)$$



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II. Functioning of PNS without defaulter

- Model
- Principal results
  - Ability of PNS to function smoothly with low levels of α and β
  - PNS functions almost like a RTGS
  - Few rejected payments ⇒ capacity of offsetting mechanisms to solve gridlocks

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III. Impact of a default when no selective modification of limits by the other participants

- Model
- Principal results

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III. Impact of a default when no selective modification of limits by the other participants

- **Model**
  - Defaulter = largest issuer (in value)
  - Technical default = from the beginning of the day
  - $\alpha \in [\ 0\ ;\ 1\ ]$ and $\beta \in [\ 0.05\ ;\ \infty\ [$
  - Indicators :
    - . Delay
    - . Rejected payments between non defaulters
    - . Rejected payments to the defaulter

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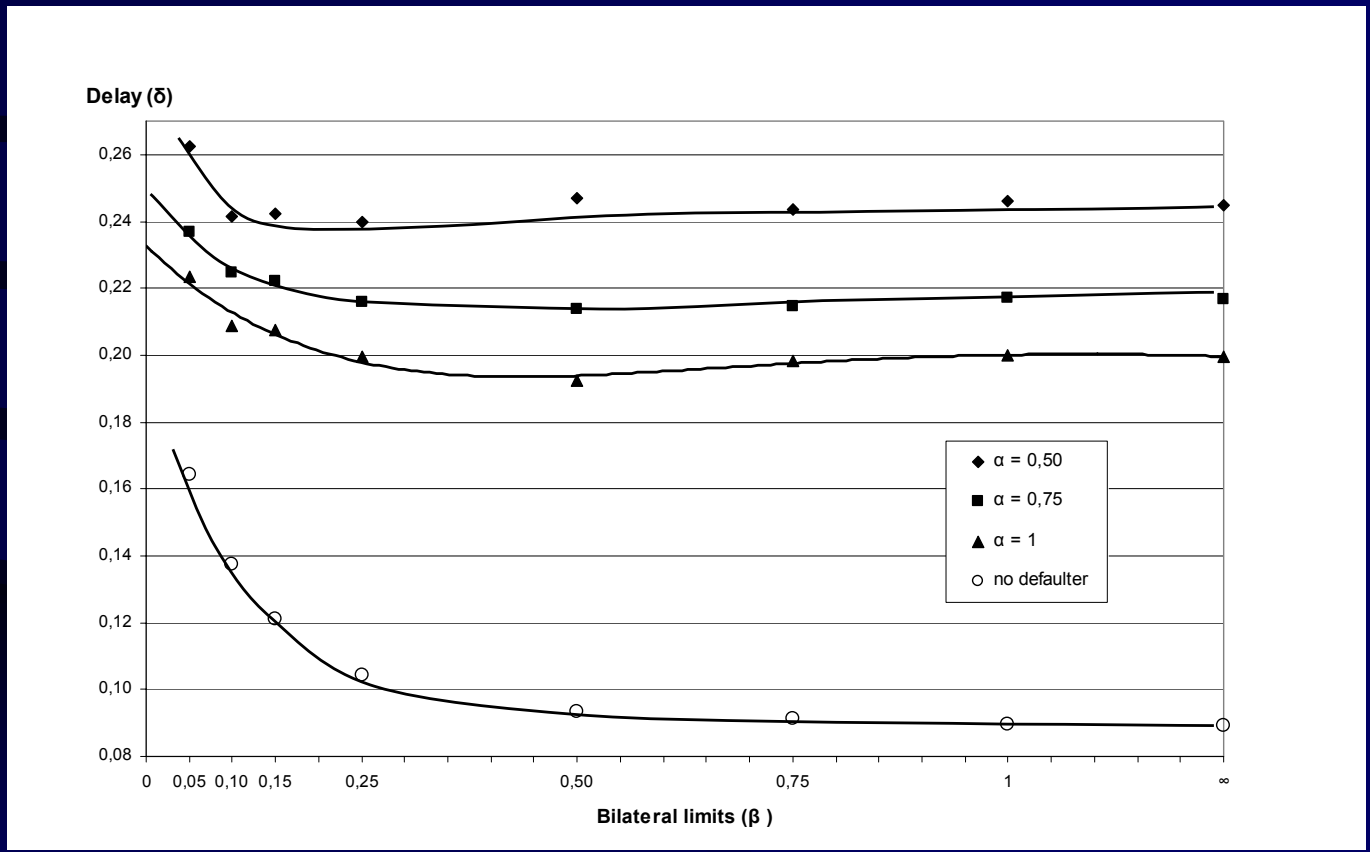
$$\delta = f(\alpha, \beta)$$



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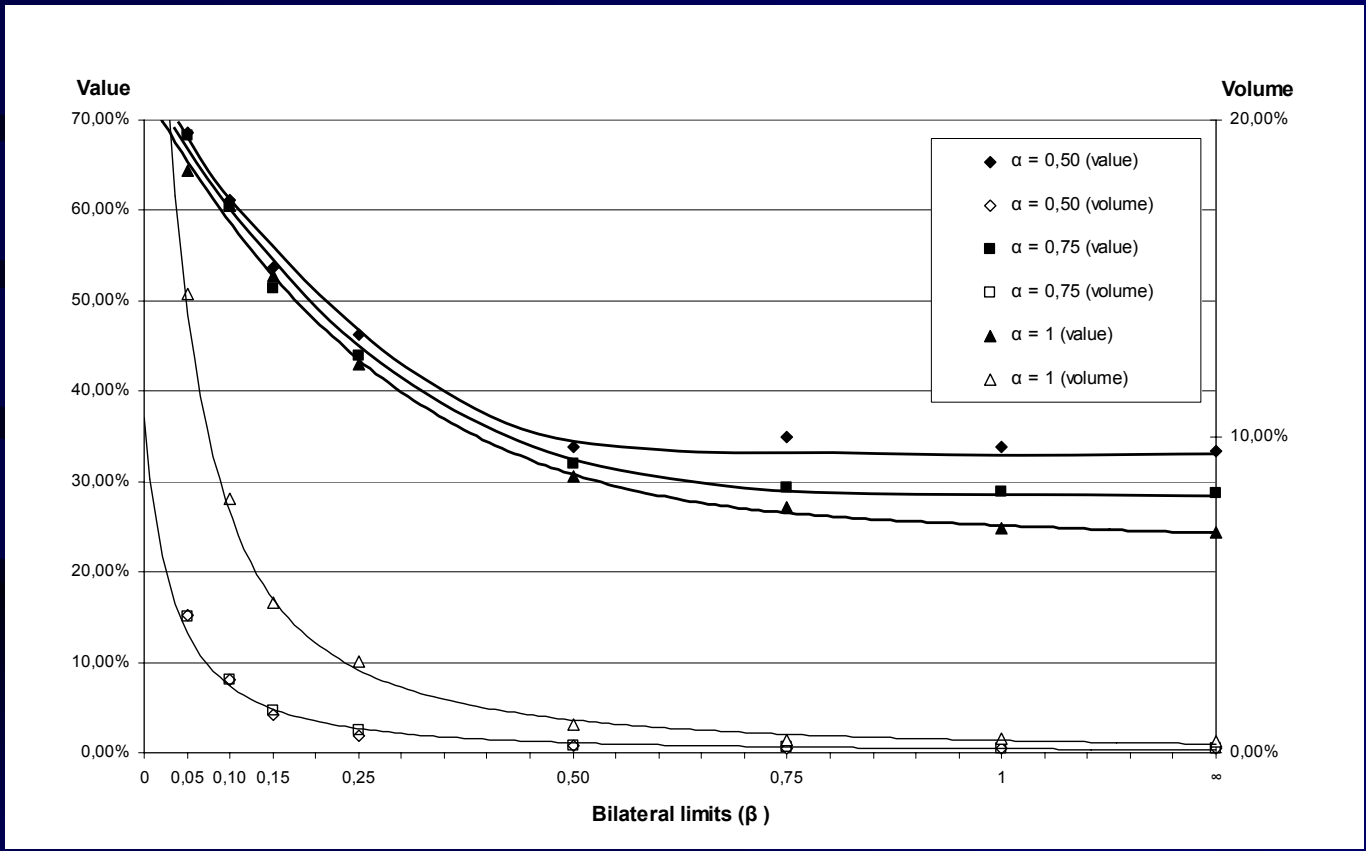
Rejected payments to the defaulter



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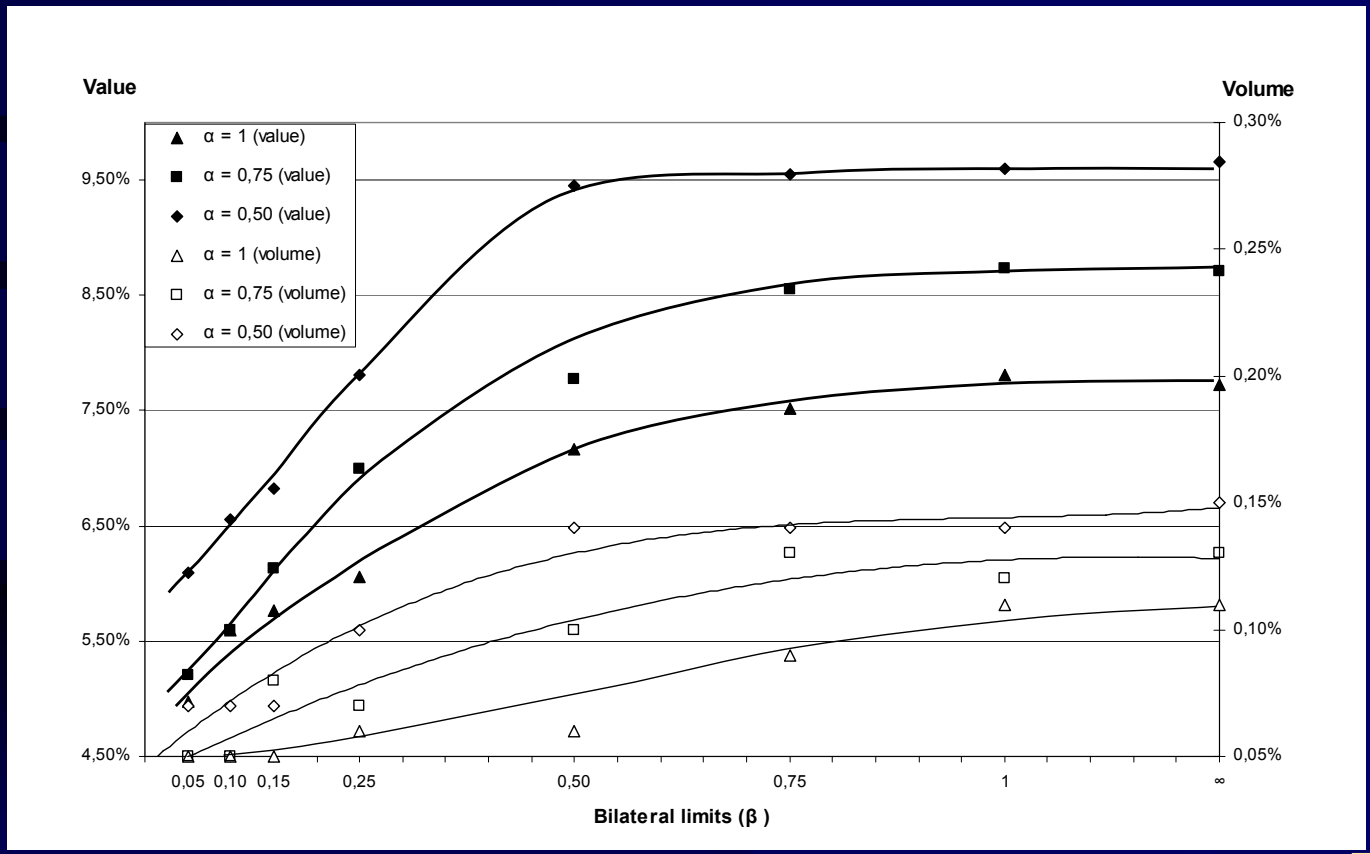
Rejected payments between non defaulters



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III. Impact of a default when no selective modification of limits by the other participants

- Model
- Principal results
  - The impact of a default is considerable
    - Rejection of up to 10 % (value) of payments between n. defaulters
    - Delay indicator more than doubles
  - Indicators very significantly with β through a combination of two effects
    - β ↓ => queued payments ↑ => δ ↑, rejected payments ↑
    - β ↓ => queued payments to defaulter ↑ => liquidity available for non defaulters ↑ => δ ↓, rejected payments ↓

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IV. Impact of a default when selective modification of limits by the other participants

- Model
- Principal results

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IV. Impact of a default when selective modification of limits by the other participants

- **Model**
  - Defaulter = largest issuer (in value)
  - Technical default = from the beginning of the day
  - Bilateral limits are set at LBBL vis-à-vis the defaulter
  - ($\alpha = 1$ and $\beta \in [\,0.25\,;\,1\,]$) + ($\alpha = 0.75$ and $\beta = 0.5$)
  - Indicators :
    - . Delay
    - . Rejected payments between non defaulters
    - . Rejected payments to the defaulter

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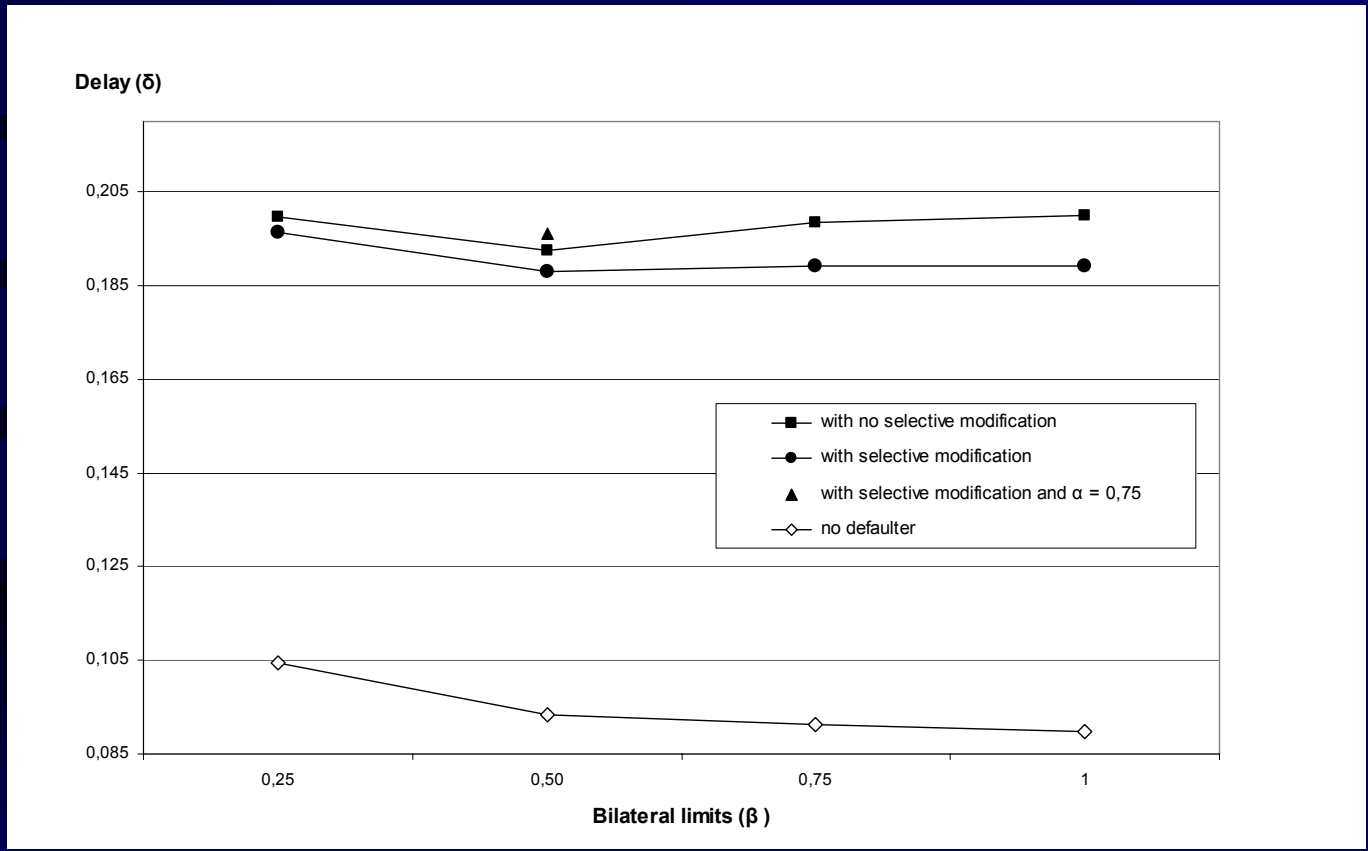
$$\delta = f(\beta)$$



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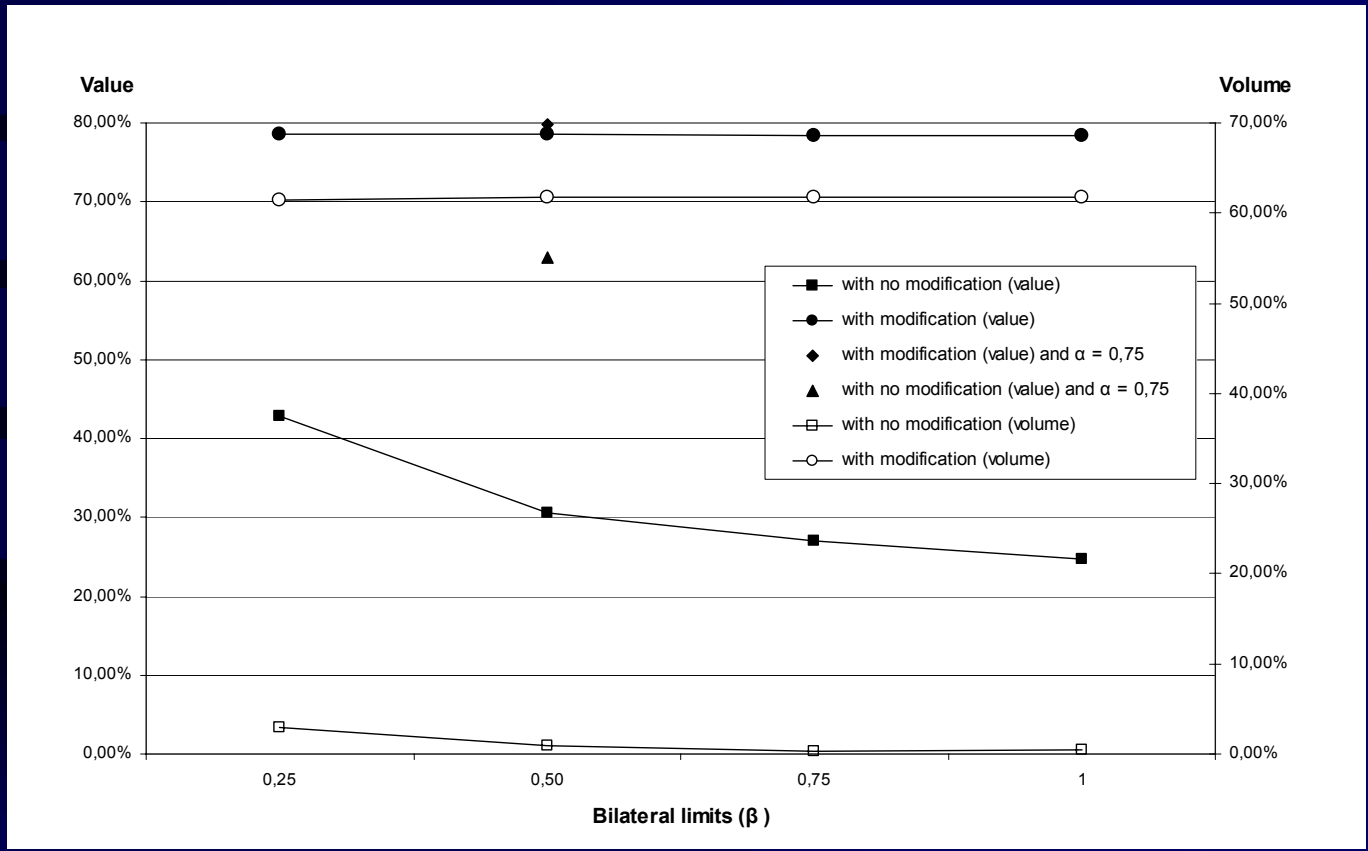
Rejected payments to the defaulter



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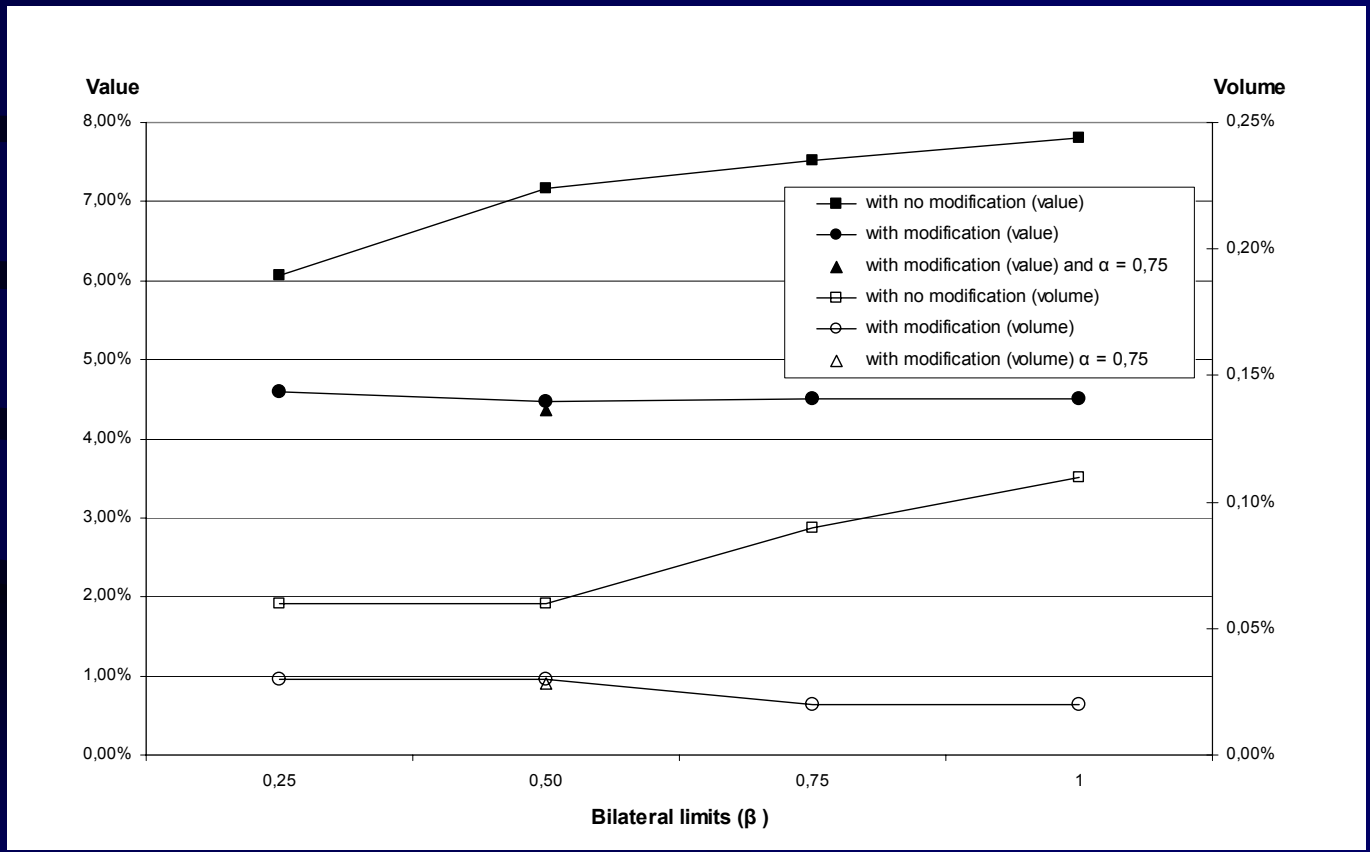
Rejected payments between non defaulters



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IV. Impact of a default when selective modification of limits by the other participants

- Model
- Principal results
  - The impact is still considerable …
  - … but the value of rejetected payments between non defaulters can be significantly reduced
    - value of rejected payments can be reduced by more than 40%
    - value of rejected payments is not sensitive to β
  - changes in other parameters => no significant impact:
    - value under which bypass FIFO mechanism
    - additional runs of multilateral offsetting mechanism

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V. Conclusion

- Technical default ⇒ can have considerable impact
- Can be reduced with :
  - Proactive behaviour : BL should be set lower by participants
    - no impact on fluidity when no default
    - positive impact in the event of a default
  - Reactive behaviour : quick recognition of a default
    => setting BL = LBBL selectively vis-à-vis the defaulter
- Suggestions for further analysis :
  - New scenarios (multiple defaults, banking default …)
  - Behavioural analysis (intra day change of limits, changed timing of liquidity transfer)
  - Other settlement algorithms or risk management tools

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