A dynamic approach to intraday liquidity needs
Discussion by Ben Craig

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Standard Disclaimer

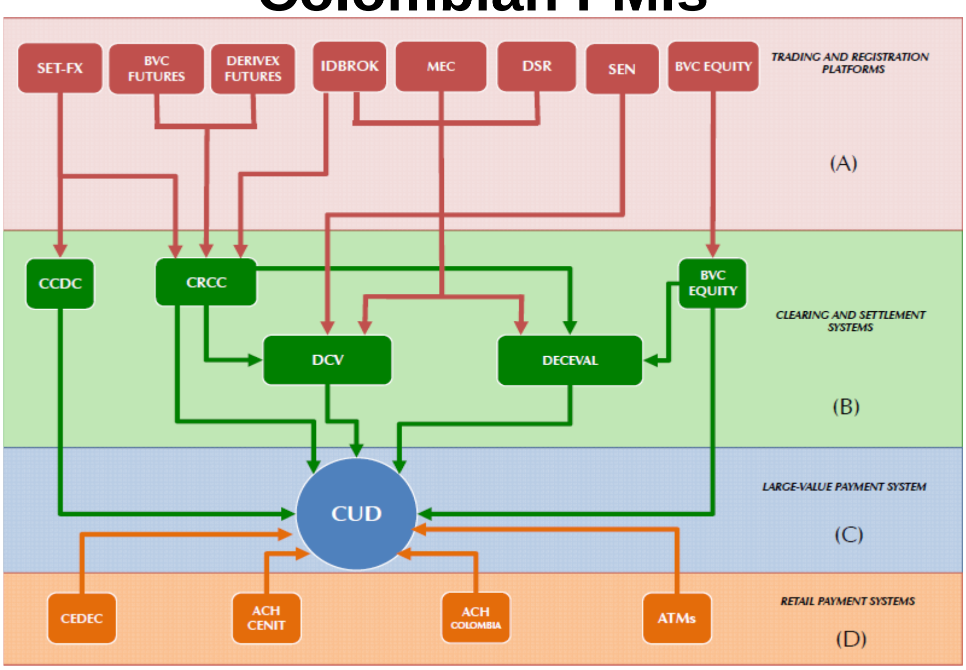
This discussion represents my views only, not those of the Deutsche Bundesbank, nor those of the European Central Bank.

Purpose

To estimate intraday liquidity needs for each selected financial institution after a failure-to-pay by its main discretionary liquidity supplier.

A laudable goal—and a very difficult one. Note how dynamics increases the difficulty many times.

Colombian FMIs



Source: Banco de la República (2012).

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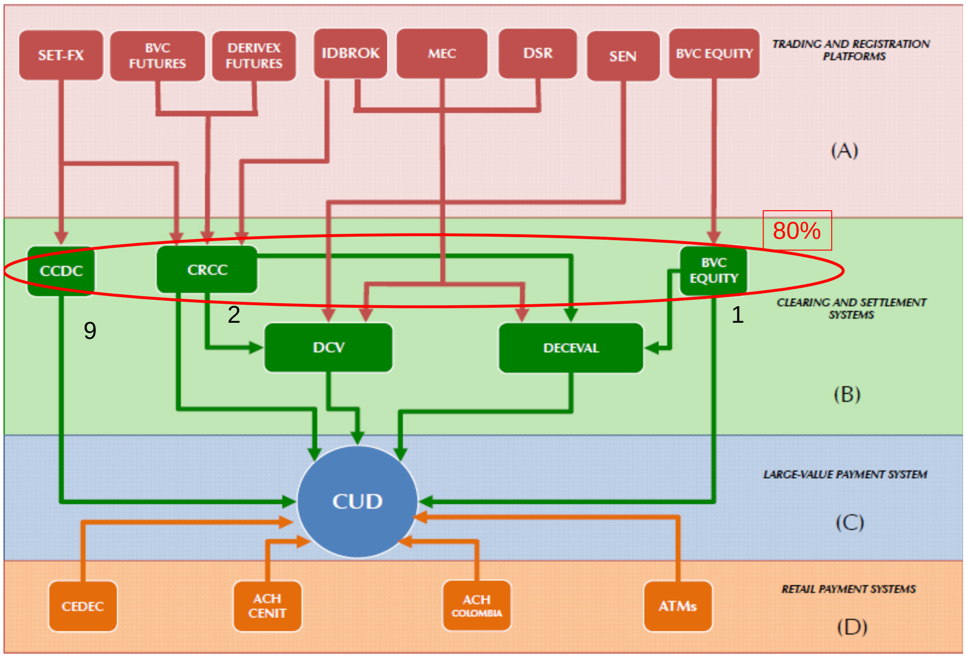

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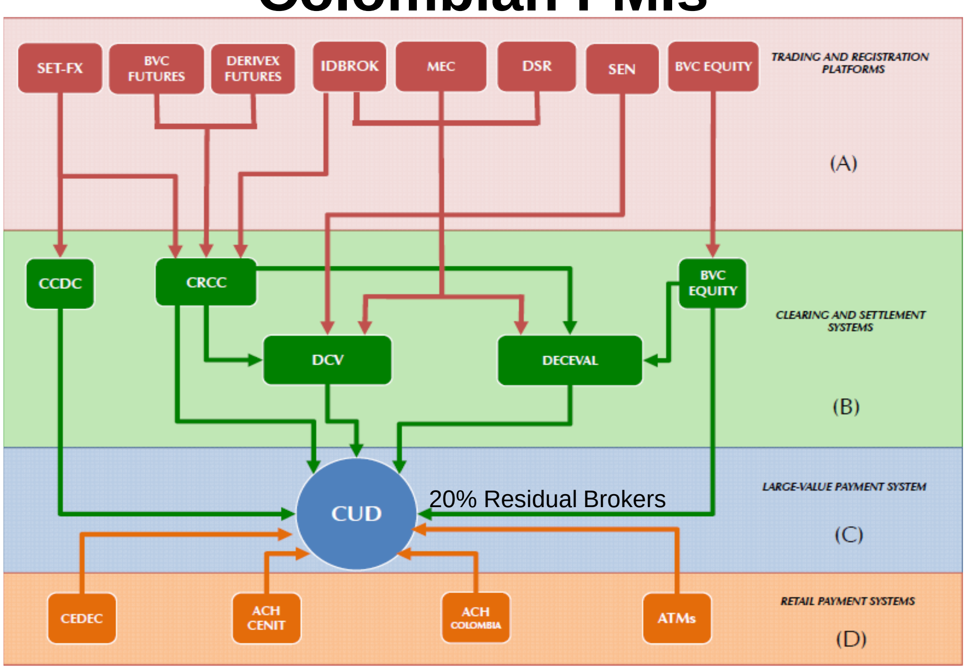

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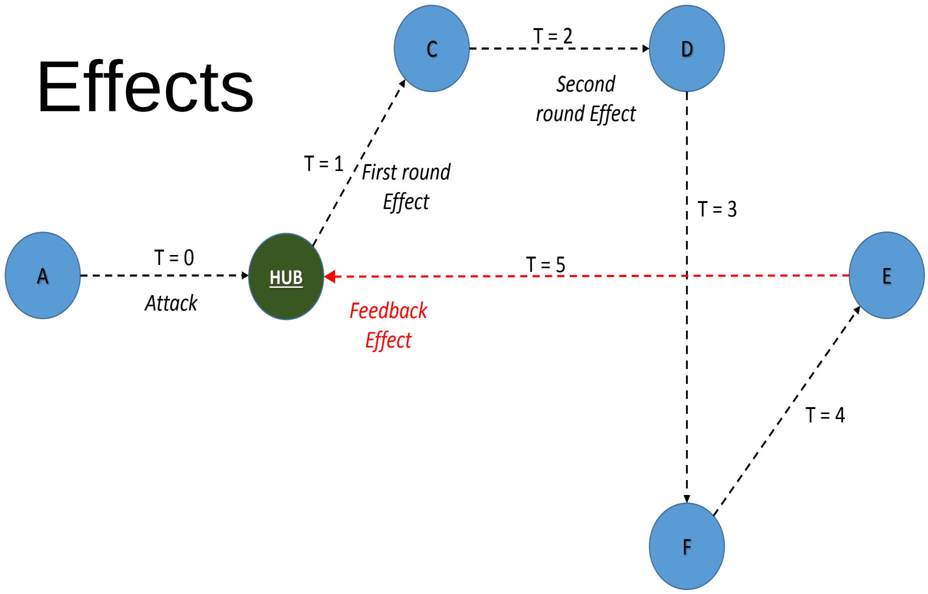

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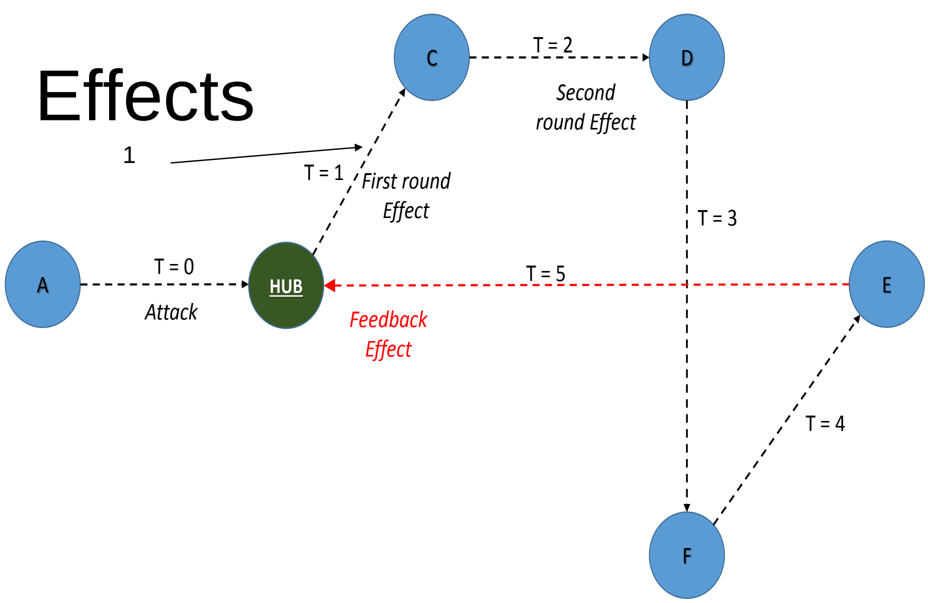

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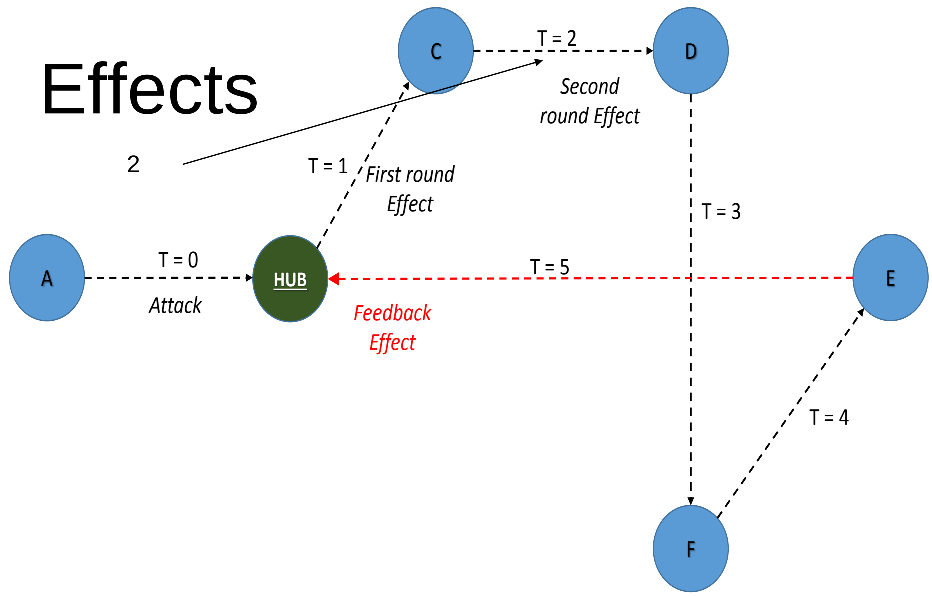

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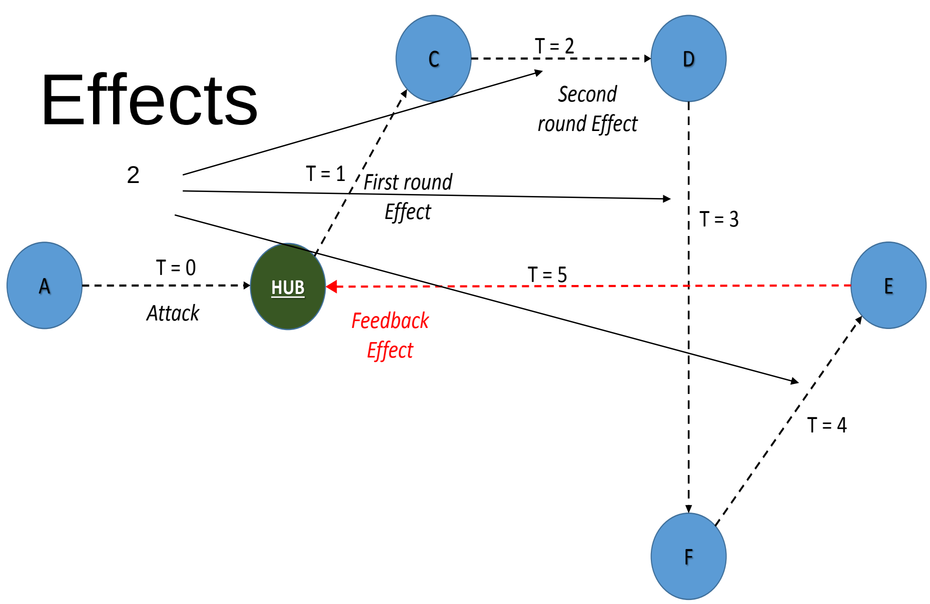

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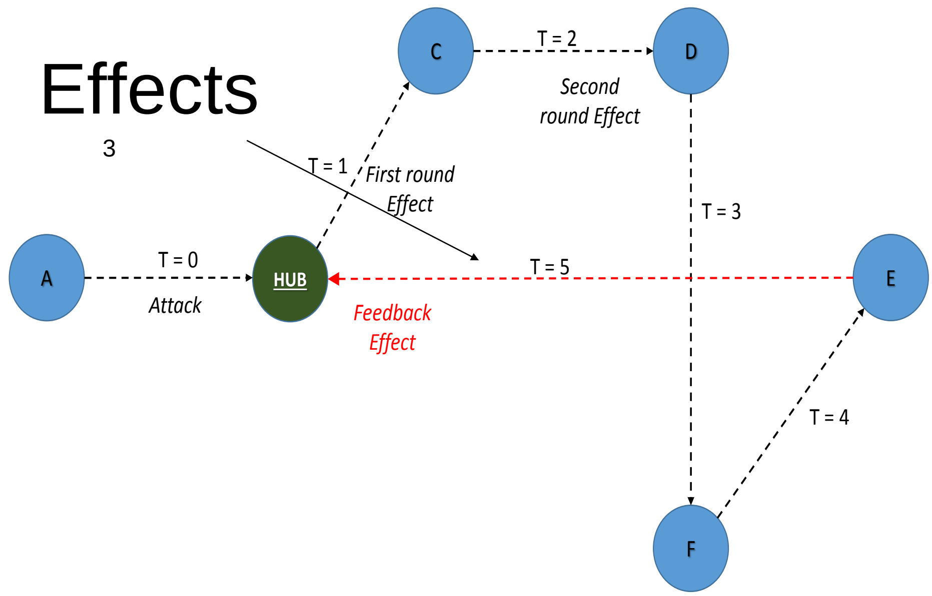


Methodology for stress-testing counterparty failures with simulation and network topology

1) Transactional Analysis in the Large Value Payments System - Period: April 2012 and April 2013

2) Select most representative types of entities in the value of payments sent (CB, BF, TC and FC)

Select the initial shocks to stress.

……Methodology

3) Select within each type, the entities to attack. Top Systematically Important under topology networks metric: HUBS

4) Daily identification for each entity to attack of its main counterparty as provider of liquidity by discretionary funds concepts and remove..

Select the type of shock to have. A failure of the main counterparty of the shocked entity.

……Methodology

5) Perform simulations in the BOF-PSS2 (approx. 1200 scenarios), using the sequence of transactions resulting from the previous point, in order to estimate:

……for attacked entity additional amount of intra-day liquidity to face failures of its main counterparty

for the other entities needs of intra-day liquidity effect resulting as second-round effect

This is the integration over probabilities with the idea that each scenario is of probability of 1/n.

……Methodology

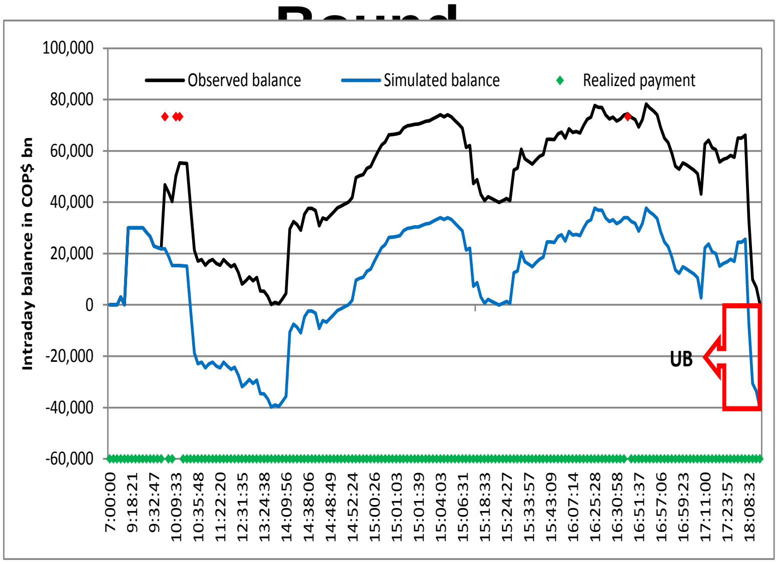
6) To evaluate how well prepared (in terms of intra-day liquidity) would be the entities to face failures of its main counterparty for concepts mentioned above,

To determine the optimal level liquidity of each entity should have in order to mitigate systemic effects in LVPS..

Periodically evaluate needs of liquidity in dinamically way taking ...

Set up a welfare measure:
How much liquidity needed to buffer the system from this shock.

Intraday balance and Upper Bound



Results With opening balance observed - April 2013

Entities	Number of days simulations were done	Amount of liquidity attacked entity did not receive from its main counterpart		Payments not settled by entity attacked (Direct effect)			Payments not settled by remaining affected entities in the system (Second-round effect)			Payments not received by entity attacked (Feedback effect)			Total average of unsettled payments as % of total payments sent for settlement
		Average daily value (*in thousands of millions of COP$*)	as % of average total value settled in the system	Number of days	Average daily value (*in thousands of millions of COP$*)	as % of average total value settled in the system	Number of entities affected	Average daily value (*in thousands of millions of COP$*)	as % of average total value settled in the system	Number of days	Average daily value (*in thousands of millions of COP$*)	as % of total value settled in the system	
Brokerage Firms													
La	22	57,6	0,15%	22	960,7	2,51%	60	5.114,9	13,38%	22	245,4	0,64%	16,54%
Lb	22	61,5	0,16%	22	415,9	1,09%	58	5.095,1	13,33%	22	90,3	0,24%	14,66%
Lc	22	41,0	0,11%	22	139,1	0,36%	14	960,6	2,51%	7	22,6	0,06%	2,94%
Ld	22	75,0	0,20%	22	202,3	0,53%	25	1.480,1	3,87%	15	14,9	0,04%	4,44%
Le	22	40,9	0,11%	22	173,0	0,45%	56	4.549,8	11,91%	22	47,0	0,12%	12,48%
Lf	22	7,5	0,02%	22	231,6	0,61%	63	6.401,4	16,75%	22	73,1	0,19%	17,55%
Lg	22	136,2	0,36%	22	229,2	0,60%	59	5.671,4	14,84%	21	37,9	0,10%	15,54%

Results With opening balance observed + TES April 2013

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Lc	22	41,0	0,11%	16	81,7	0,21%	2	45,2	0,12%	2	1,0	0,00%	0,33%
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Lf	22	7,5	0,02%	13	225,5	0,59%	16	670,0	1,75%	13	19,1	0,05%	2,39%
Lg	22	136,2	0,36%	22	225,6	0,59%	7	318,3	0,83%	11	7,9	0,02%	1,44%

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Conclusions

- Results confirm a non-linear relationship between the initial failure-to-pay by a specific institution and the failure-to-pay by the rest of the system.

- These non-linearities are the result of (i) payment synchronization; (ii) network structure of fund transfers; and (iii) the importance of recirculation of balances resulting from coordinated payments between participants in the system as a source of liquidity for financial

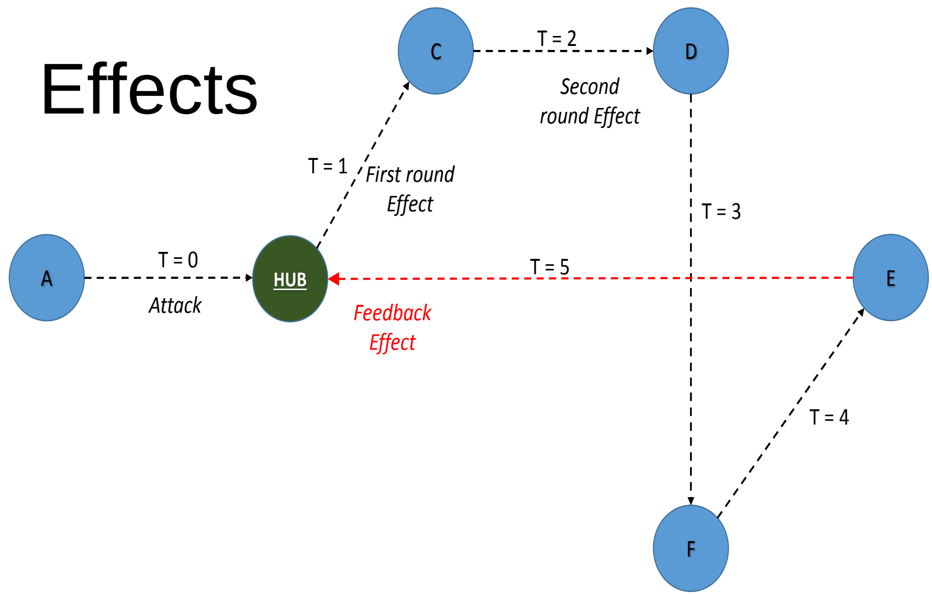
The conclusions undersell the paper. It is an important contribution, and should be sold.

Stress tests of systems where the players are well understood are rare and very important to policy.

And not just for Columbia.

Some minor comments on method.

Effects



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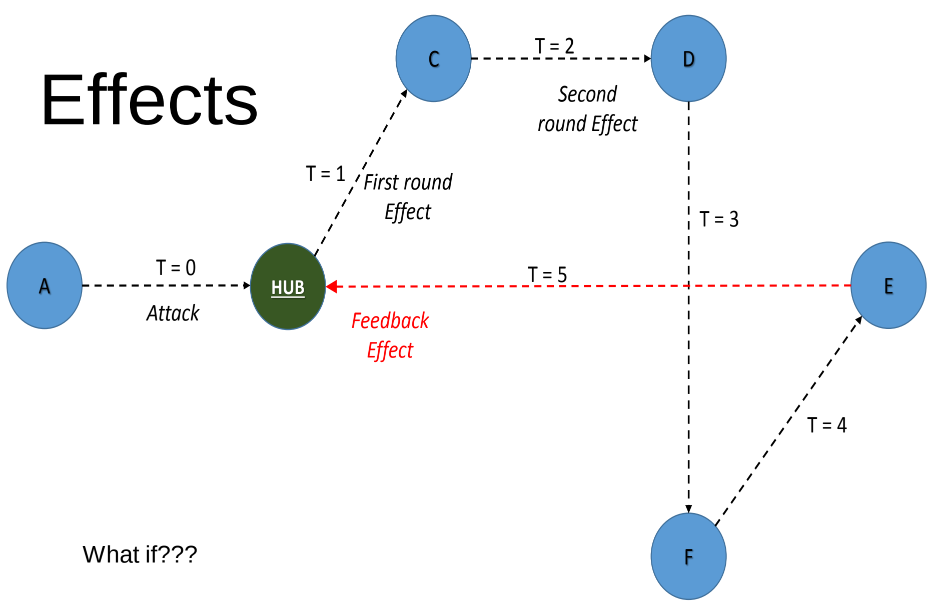
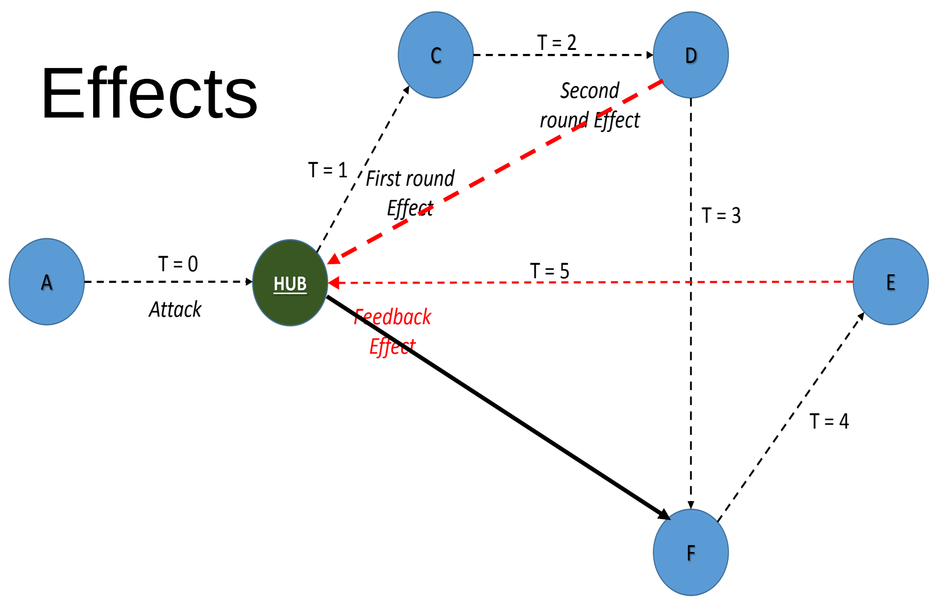


What if???

Effects



Does just tying off the simulation with feedback really acknowledge the full extent of the type 2 distress? Or acknowledge the ability of the system to absorb the stress?

For example, a single entity paying only to a small entity could cause very large losses.

Single entities to large counterparties cause no losses.

Network structure matters. Does this reflect our notion of welfare and optimal liquidity?

Harder Problem—what is the welfare loss and welfare gain of the stress?

Even if absorbed, the stress causes delays.

Balance between delays, failures and liquidity

- Big cost of a RTGS system is the liquidity it requires. This can add stability, but costs in terms of liquidity.
- Delays themselves are costly. Adding up the delays is the first step to comparison of the costs of liquidity.

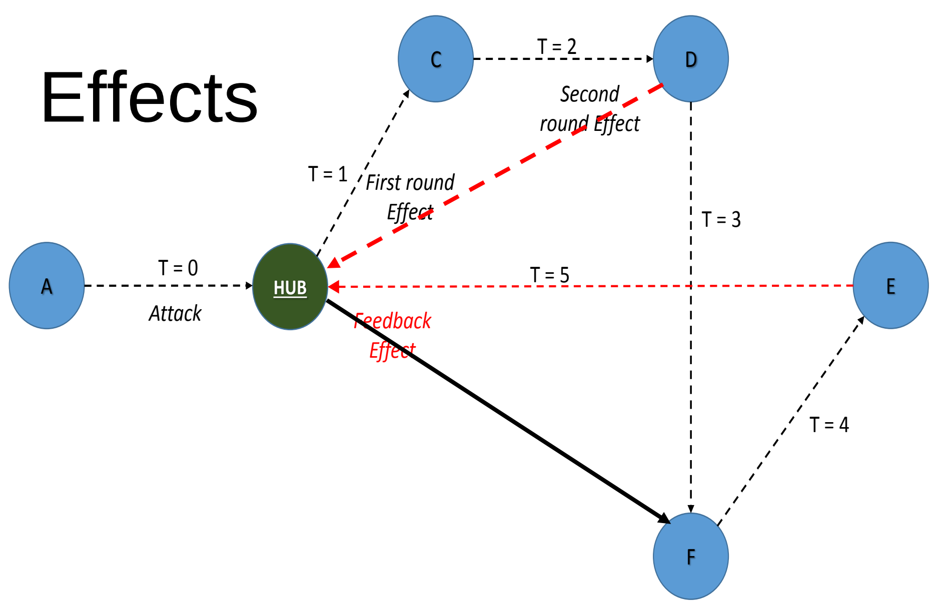
Note the advantages of the approach with these data over stress in banking.

In banking a simultaneous default cascade induces large problems in assessing the costs.

And Eisenberg-Noe is not really a model of contagion.

Here the problem is easier. But the problem is in handling that end round.

Effects



Great paper!

Large effort shows a lot about an interesting payments system.

Sell it harder!