

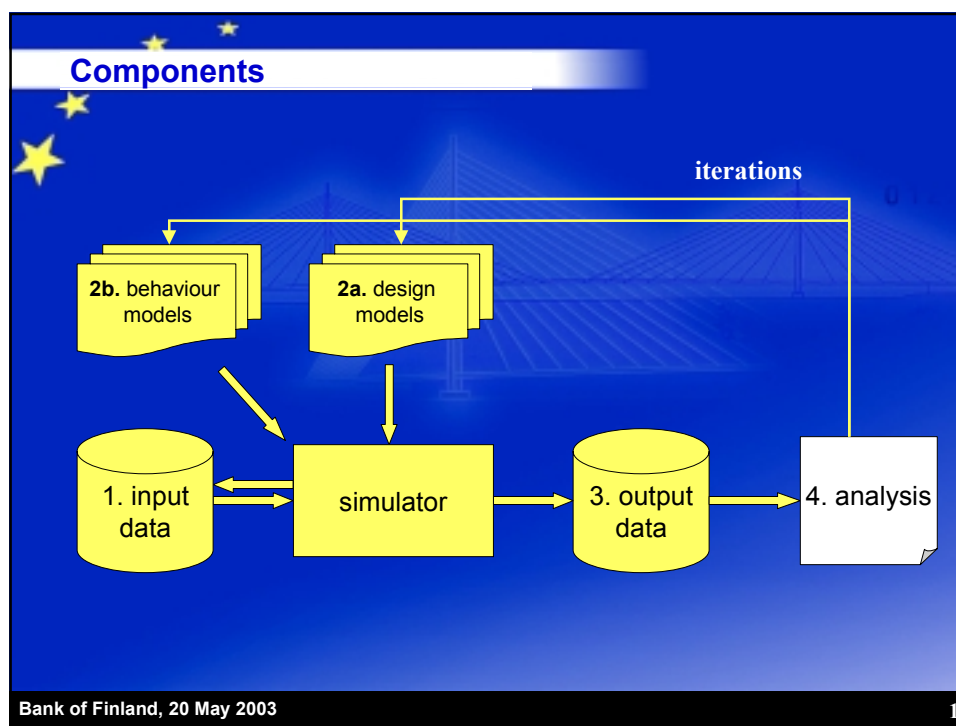

EUROPEAN CENTRAL BANK

Preparing simulations

practical issues

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on input data ...

- Consists of:
 - transaction data (TRAN)
 - participant data (PART)
 - daily opening balances (DBAL)
 - intraday credit limit data (ICCL)
- Questions:
 - how many days?
 - which transactions to include?
 - erroneous payments and their corrections?
 - payments between several accounts of same account holder?
 - how to handle repos?

Can be the most labour intensive part, the simulator includes some cross checks to validate data

Transaction data (1)

Field name	Detailed name	Required
T_DATSETID	Data set ID	Y
T_SYSTEMID	System ID	Y
T_TRANSAID	Transaction ID	Y
T_INTRDATE	Introduction date	Y
T_INTRTIME	Introduction time	Y
T_TRANVALU	Transaction value	Y
T_FRSYSTID	From system ID	Y
T_FRPARTID	From participant ID	Y
T_FRACCOID	From account ID	Y
T_TOSYSTID	To system ID	Y
T_TOPARTID	To participant ID	Y
T_TOACCOID	To account ID	Y
... continued		

Identifier information

- DATSETID to enable the importing of parallel data sets
- SYSTEMID to identify the system in which the payment is submitted
- TRANSAID to uniquely identify each payment

Transaction data (2)

Field name	Detailed name	Required
T_DATSETID	Data set ID	M
T_SYSTEMID	System ID	M
T_TRANSAID	Transaction ID	M
T_INTRDATE	Introduction date	M
T_INTRTIME	Introduction time	M
T_TRANVALU	Transaction value	M
T_FRSYSTID	From system ID	O
T_FRPARTID	From participant ID	M
T_FRACCOID	From account ID	O
T_TOSYSTID	To system ID	O
T_TOPARTID	To participant ID	M
T_TOACCOID	To account ID	O
... continued		

- The date and time the payment is actually submitted to the system depends on the submission algorithm used
- The submission algorithm available now submits the payment to the system according to the date/time set here
- The original value of the transaction (two digits)

Transaction data (3)

Field name	Detailed name	Required
T_DATSETID	Data set ID	M
T_SYSTEMID	System ID	M
T_TRANSAID	Transaction ID	M
T_INTRDATE	Introduction date	M
T_INTRTIME	Introduction time	M
T_TRANVALU	Transaction value	M
T_FRSYSTID	From system ID	O
T_FRPARTID	From participant ID	M
T_FRACCOID	From account ID	O
T_TOSYSTID	To system ID	O
T_TOPARTID	To participant ID	M
T_TOACCOID	To account ID	O
... continued		

- The system, participant/account the payment is debited from (T_FR...) and credited to (T_TO...)

Transaction data (4)

... continued		
Field name	Detailed name	Required
T_ASSENAME	Asset name	N
T_DESCRIPT	Description	N
T_LINKCODE	Link code	N
T_LINKSYST	Linked system	N
T_TRANCLAS	Transaction class	N
T_USERDEID	User defined ID	N
T_USERCOD1...5	User defined codes 1...5	N
T_PRIORITY	Priority	N
T_PROCTYPE	Processing type	N
T_PROCDATE	Processing date	N
T_PROCTIME	Processing time	N

- The name of the asset stored on the account (e.g. NOK1V for Nokia shares) and its description

Transaction data (5)

... continued		
Field name	Detailed name	Required
T_ASSENAME	Asset name	O
T_DESCRIPT	Description	O
T_LINKCODE	Link code	O
T_LINKSYST	Linked system	O
T_TRANCLAS	Transaction class	O
T_USERDEID	User defined ID	O
T_USERCOD1...5	User defined codes 1...5	O
T_PRIORITY	Priority	O
T_PROCTYPE	Processing type	O
T_PROCDATE	Processing date	O
T_PROCTIME	Processing time	O

- The PVP and DVP mechanisms match the two legs on the basis of a unique link code attached to them
- For such transactions the code and the system where the corresponding transaction can be found must be provided

Transaction data (6)

... continued		
Field name	Detailed name	Required
T_ASSENAME	Asset name	O
T_DESCRIPT	Description	O
T_LINKCODE	Link code	O
T_LINKSYST	Linked system	O
T_TRANCLAS	Transaction class	O
T_USERDEID	User defined ID	O
T_USERCOD1...5	User defined codes 1...5	O
T_PRIORITY	Priority	O
T_PROCTYPE	Processing type	O
T_PROCDATE	Processing date	O
T_PROCTIME	Processing time	O

- The simulator provides a wide range of possibilities to store information on transactions that accompany the transaction to the output data
- Can be used in analysing results ...
- ... and by user defined modules (e.g. new submission algorithms) to base their operation on

Transaction data (7)

... continued		
Field name	Detailed name	Required
T_ASSENAME	Asset name	O
T_DESCRIPT	Description	O
T_LINKCODE	Link code	O
T_LINKSYST	Linked system	O
T_TRANCLAS	Transaction class	O
T_USERDEID	User defined ID	O
T_USERCOD1...5	User defined codes 1...5	O
T_PRIORITY	Priority	O
T_PROCTYPE	Processing type	O
T_PROCDATE	Processing date	O
T_PROCTIME	Processing time	O

- Finally, the simulator offer the possibility to introduce various delayed processing options for transactions at a reference date/time
- The payment is submitted to the system, but settled only at date and time set here (either exactly at this time, not before this time, or it must be settled by this time)

Participant data (1)

Field name	Detailed name	Required
P_DATSETID	Data set ID	M
P_SYSTEMID	System ID	M
P_PARTICID	Participant ID	M
P_ACCOUNTID	Account ID	M
P_FULLNAME	Full name	O
P_SHORTACR	Short acronym	O
P_ACCONAME	Account name	O
P_SETINSYS	Settles in system	O
P_SETONPAR	Settles on participant	O
P_SETONACC	Settles on account	O
P_LIQFRSYS	Liquidity injection from system	O
P_LIQFRPAR	Liquidity injection from participant	O
P_LIQFRACC	Liquidity injection from account	O
P_LIQINJVA	Participant/account specific liquidity injection value	O

System, participant and account information

- enables simulations for multiple systems (e.g. TARGET) and multiple accounts per participant (securities / FX settlement systems)

Participant data (2)

Field name	Detailed name	Required
P_DATSETID	Data set ID	M
P_SYSTEMID	System ID	M
P_PARTICID	Participant ID	M
P_ACCOUNTID	Account ID	M
P_FULLNAME	Full name	O
P_SHORTACR	Short acronym	O
P_ACCONAME	Account name	O
P_SETINSYS	Settles in system	O
P_SETONPAR	Settles on participant	O
P_SETONACC	Settles on account	O
P_LIQFRSYS	Liquidity injection from system	O
P_LIQFRPAR	Liquidity injection from participant	O
P_LIQFRACC	Liquidity injection from account	O
P_LIQINJVA	Participant/account specific liquidity injection value	O

Information required for ancillary system settlement

- required for simulations where ancillary systems settle in a main system (e.g. Euro 1)

Participant data (3)

Field name	Detailed name	Required
P_DATSETID	Data set ID	M
P_SYSTEMID	System ID	M
P_PARTICID	Participant ID	M
P_ACCOUNID	Account ID	M
P_FULLNAME	Full name	O
P_SHORTACR	Short acronym	O
P_ACCONAME	Account name	O
P_SETINSYS	Settles in system	O
P_SETONPAR	Settles on participant	O
P_SETONACC	Settles on account	O
P_LIQFRSYS	Liquidity injection from system	O
P_LIQFRPAR	Liquidity injection from participant	O
P_LIQFRACC	Liquidity injection from account	O
P_LIQINJVA	Participant/account specific liquidity injection value	O

Information from which system and participant/account liquidity injections to the system are made

- required for the simulation of automatic liquidity bridges between two systems

Balance data

Field name	Detailed name	Required
B_DATSETID	Data set ID	M
B_SYSTEMID	System ID	M
B_PARTICID	Participant ID	M
B_DATEEFFE	Date effective	M
B_ACCOUNID	Account ID	M
B_NEWVALUE	New value	M

Identifiers as before

Balance at the beginning zero, set as changes

- Date when effective (from the beginning of the day)
- Account to which the balance is set
- New value of balance

Credit limits

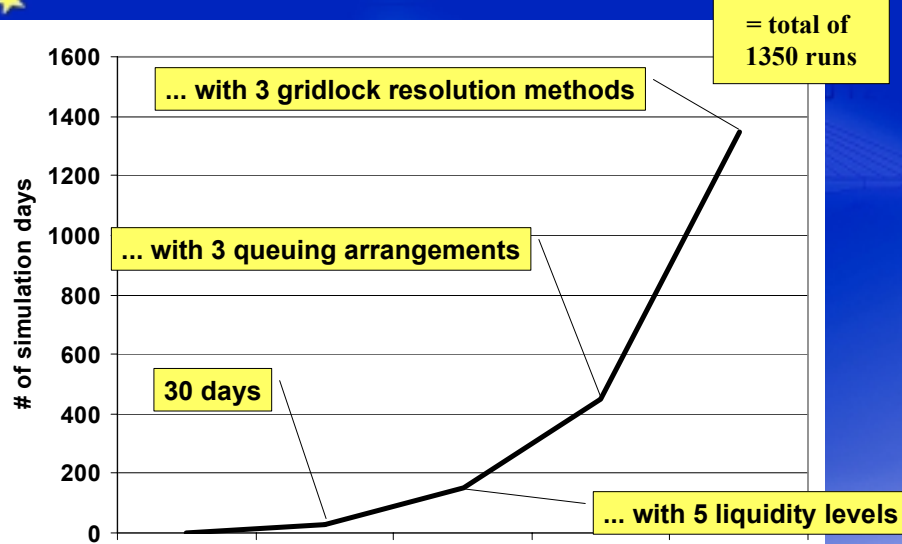
Field name	Detailed name	Required
I_DATSETID	Data set ID	M
I_SYSTEMID	System ID	M
I_PARTICID	Participant ID	M
I_DATEEFFECTE	Date effective	M
I_TIMEEFFECTE	Time effective	M
I_ACCOUNTID	Account ID	M
I_NEWVALUE	New value	M

Identifiers as before

As with balances before

However, a time must be set when the credit limit is changed (to enable intraday changes in credit limits)

On models... No. of simulations needed



Data management challenge

- Output for one day takes
 - 1) for small data sets (BoF-RTGS, KRONOS) around 0.5MB
 - 2) for large data sets (TARGET, Fedwire) up to 50MB
- i.e. for 1350 simulation runs (days)
 - 1) 675MB = 0.7GB
 - 2) 67,500MB = 67.5GB
- Have the right software (e.g. Excel for small simulations, Access for medium, and SAS for larger ones)
- Export and report results selectively

Time management challenge

- To simulate one day takes
 - 1) for small data sets a minute
 - 2) for large data sets between 15 and 120 minutes
- i.e. for 1350 simulations runs (days)
 - 1) 1350 minutes = 23 hours
 - 2) 1350 hours = 56 days (assuming 1h average)
- Have the right hardware (a desktop for small and medium simulations up to a computer farm for larger ones)
- Test first how long the simulations take and calculate a plan that is executable

To sum up

- Data requirements depend on objective of simulations, you get started with date/time, sender, receiver, and value of payment, opening balances and credit limits
- It is probably not possible to simulate all combinations - be selective on both the number of models and the statistics for the simulator to report
- Plan, document, name properly, iterate
- Your appetite will grow - at some point you may need to consider developing user modules

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Thank you, questions?