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The SST Group Structure Model

*Walter Saxer-Versicherungs-Hochschulpreis
Prize Ceremony*

Thorsten Pfeiffer
Zurich, February 26, 2008



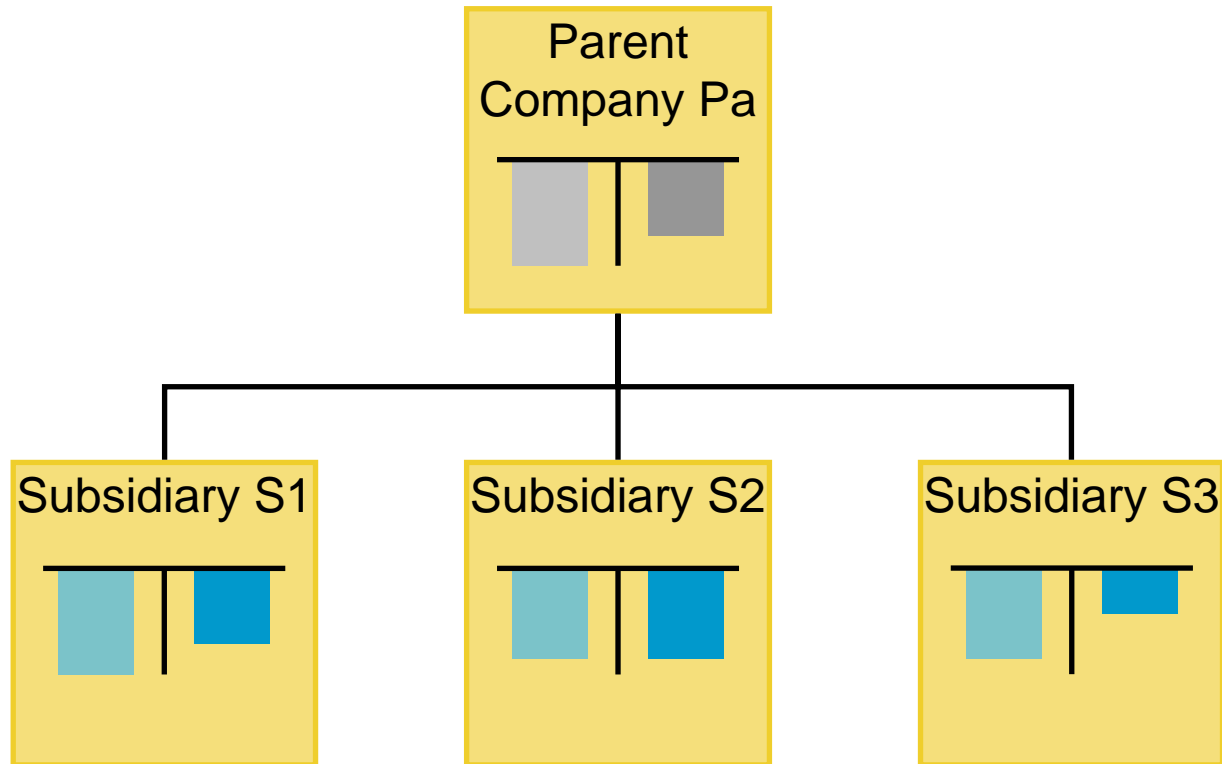
The SST Group Structure Model

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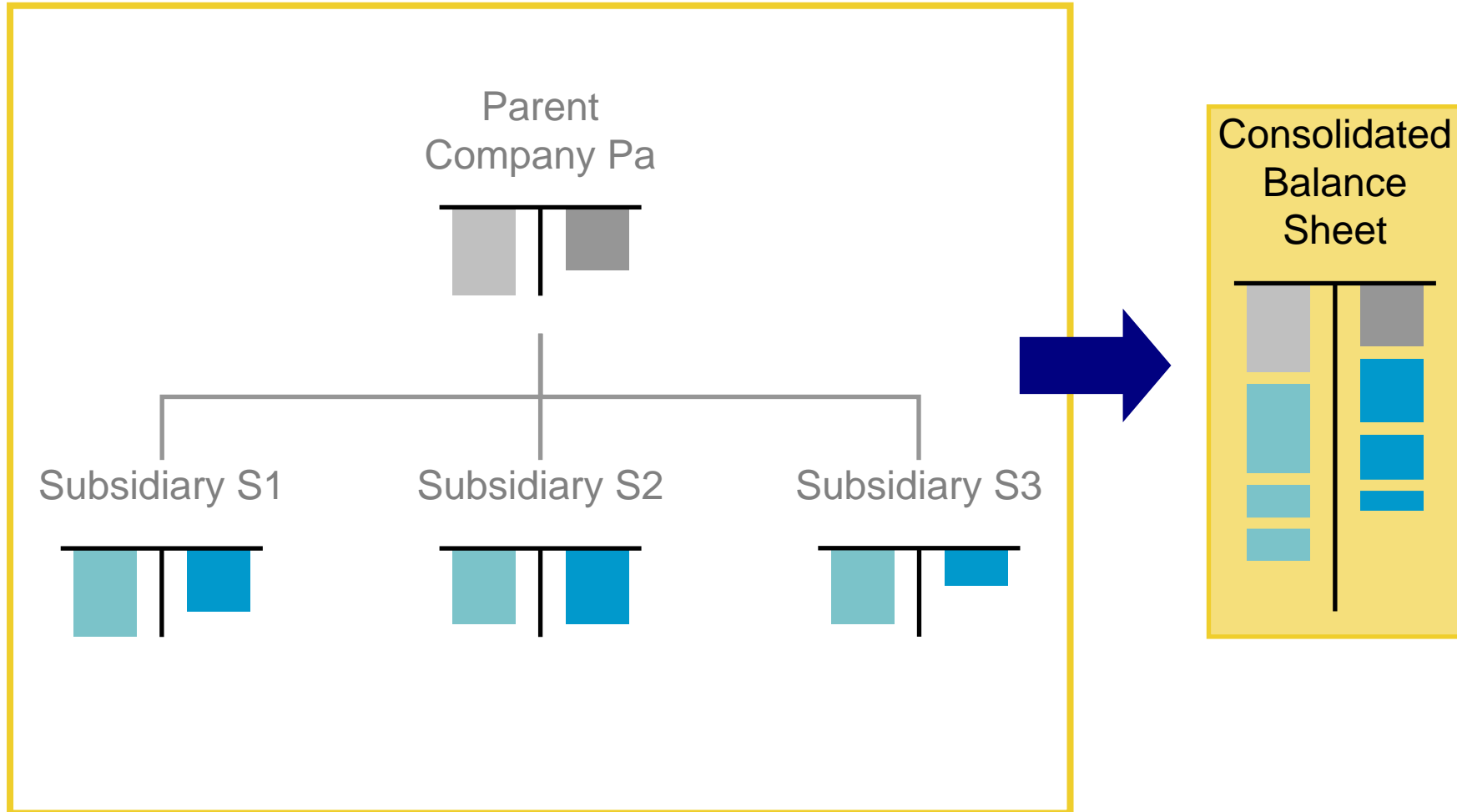
Insurance Group...



- a set of (at least two) legal entities bound by some type of ownership
- at least one of the legal entities runs insurance operations



Consolidated View

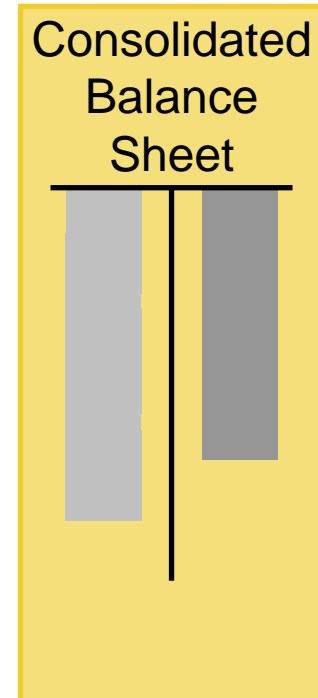




Valuation using Consolidated View

Consolidated balance sheet:

- Well known and established approach in accounting, e.g. used for valuation
- Is *one single basket* of all assets and liabilities towards external parties
- Transactions between group members (legal entities) cancel out each other
- *Neglects information* about which legal entity has which liability
- Issue: accounting versus risk?





Risk Management using Consolidated View

Unlimited Fungibility

- Assumes that any asset can legally be used to cover any loss
- Assumes that top management is willing to use / spend any asset to cover any loss

Musketeer approach

"One for all and all for one"

Assumes that either

- **all** legal entities or
- **no** legal entity

of the group are insolvent

Typically, risk is captured by

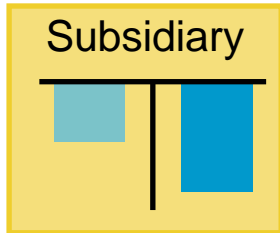
one single number for the whole group





Risk Management using Consolidated View

Strong assumptions using the consolidated view for *risk management purposes* do *not* hold in practice:



- A group will support a subsidiary *in distress* only if this is preferable for the owners of the group
- There are *real life examples* of failing groups where some legal entities survived and others became bankrupt
- External institutions such as rating agencies or regulators might even *prevent* a group from injecting capital into an insolvent subsidiary



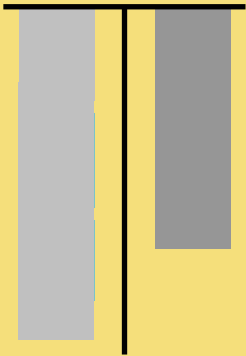
Risk Management using Consolidated View

Subsidiary



- The existence of “overall” capital covering the “overall” risk does *not* mean that *all* legal entities and their policyholders are protected on the required level

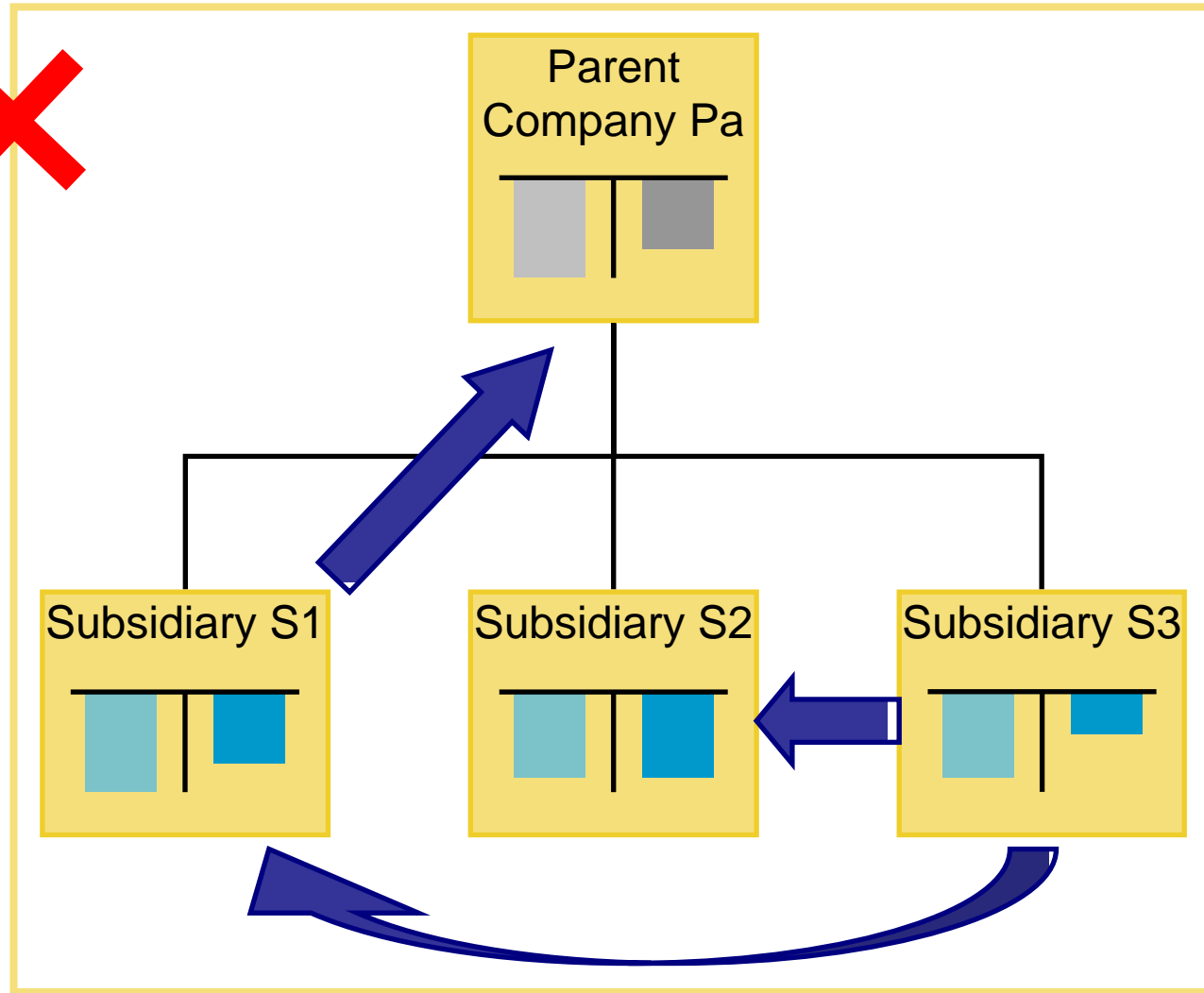
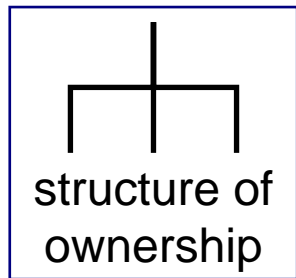
Consolidated
Balance
Sheet



- Thus, calculating the *risk* of a group on the basis of a consolidated view provides only a virtual result
- “Diversification” rather *input* into then *output* of the model
 - Allocating financial requirements to group members is done rather *arbitrarily*
 - Nota bene: diversification *does* exist within a group; the consolidated view just cannot tell who owns the diversification

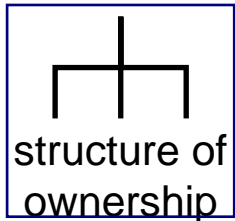


The SST Group *Structure* Model





The SST Group *Structure* Model



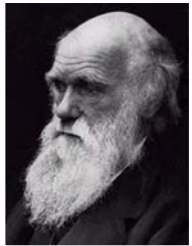
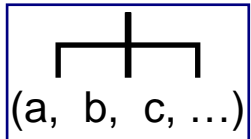
A group is a set of legal entities **plus** the information of

- who owns whom (**structure of ownership**),
- which type of capital has been transferred between group members (**capital transfer instruments: loans**), and
- which risks are transferred between which group members (**risk transfer instruments: guarantees, reinsurance contracts**).

- The SST is based on *structure* of the group rather than the assumption of a virtual hull around the group members
- Consequently, there is *nothing such* as one and only one capital requirement based on a virtual hull



The SST Group *Structure* Model



Risk is measured on the level of *each* legal entity

- Taking into account *exactly* all existing *legally binding* capital and risk transfer instruments (crti)
- Providing a collection of comprehensive, *connected*, and *simultaneous* solo views
- Resulting in an individual financial requirement for each group member rather the one for the group (*vector* instead of scalar)

Each group member is assumed to behave in a way which is

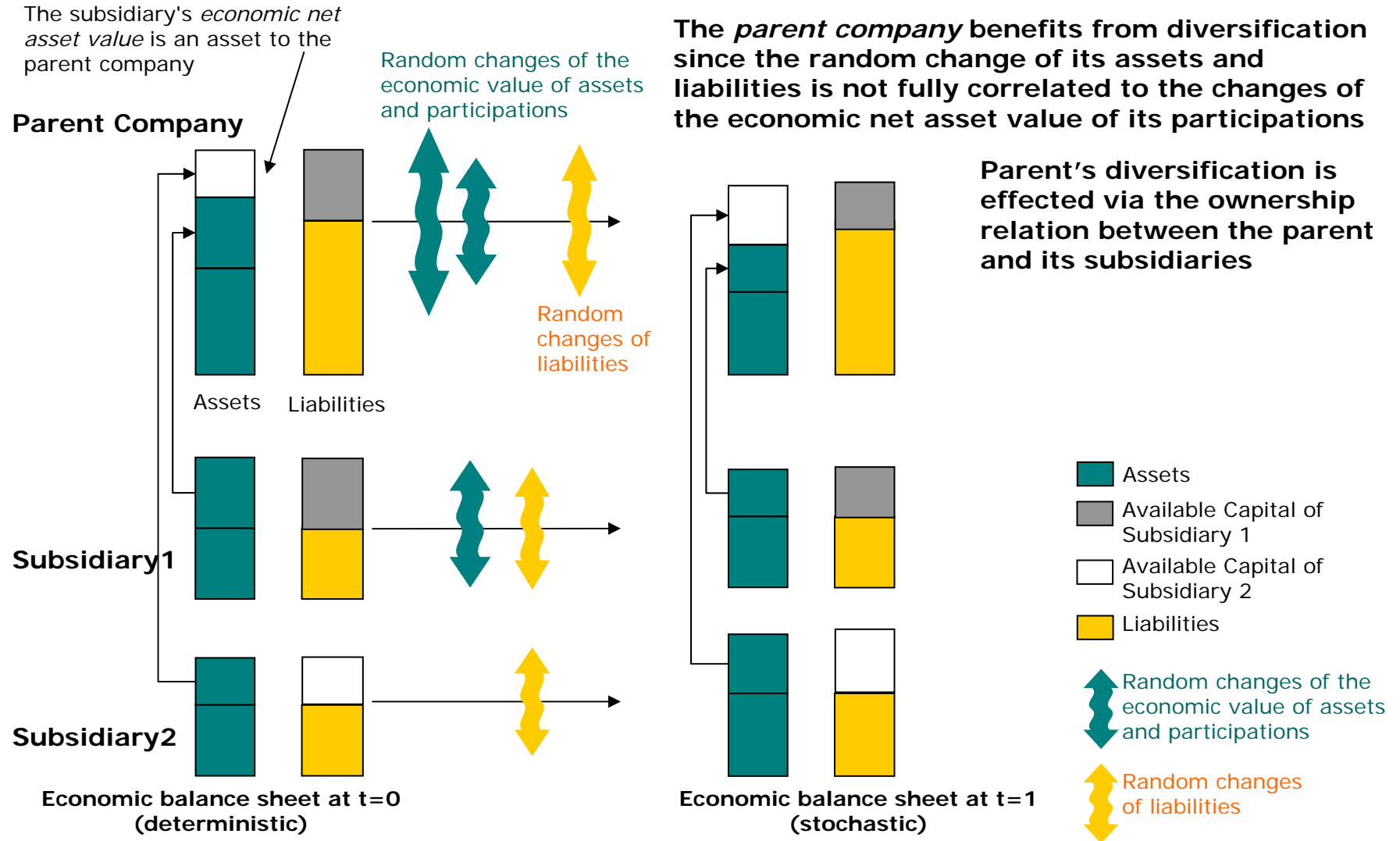
- best in its own interest
- within the constraints of its legal obligations and crt

Owning a subsidiary is equal to holding an asset

- Like any other asset, any subsidiary has a known current (economic net asset) value and uncertain future value
- Diversification between different assets (including subsidiaries) is *naturally* allocated to owner of the assets



Diversification: natural model output





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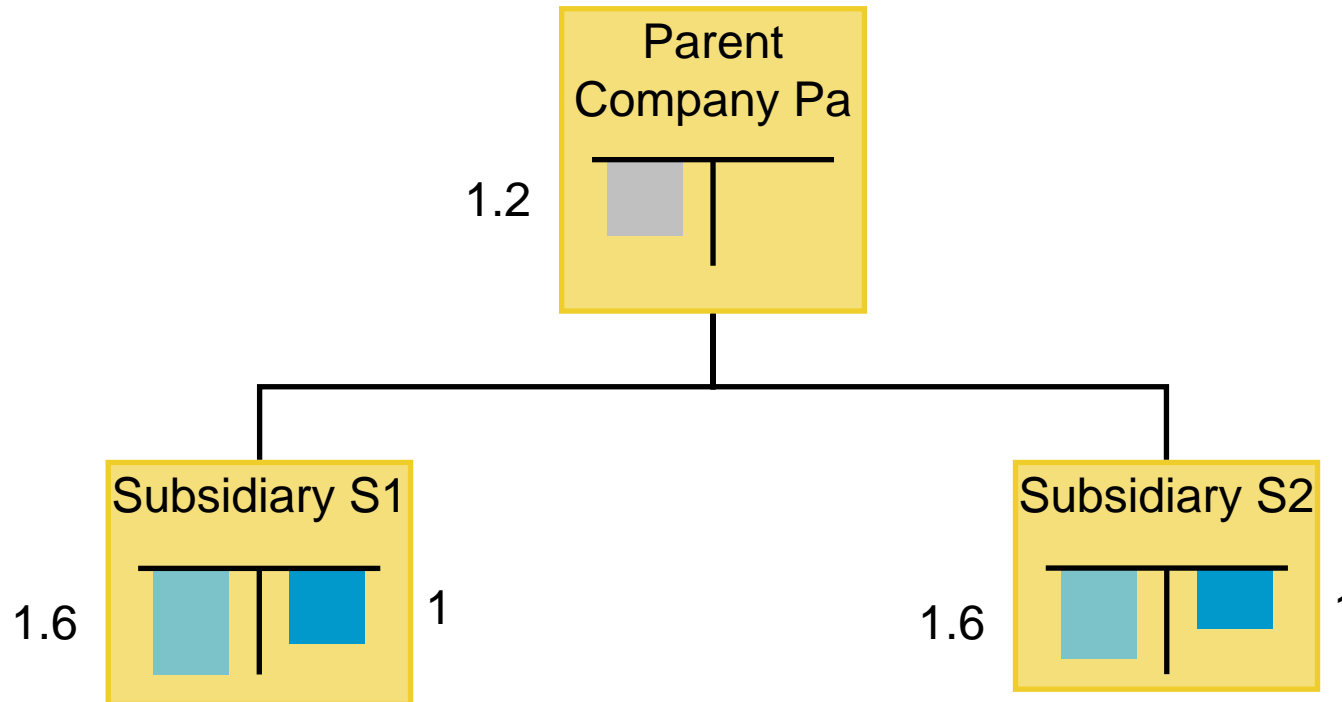
The SST Group Structure Model

*Walter Saxer-Versicherungs-Hochschulpreis
Prize Ceremony*

Numerical Examples
Zurich, February 26, 2008



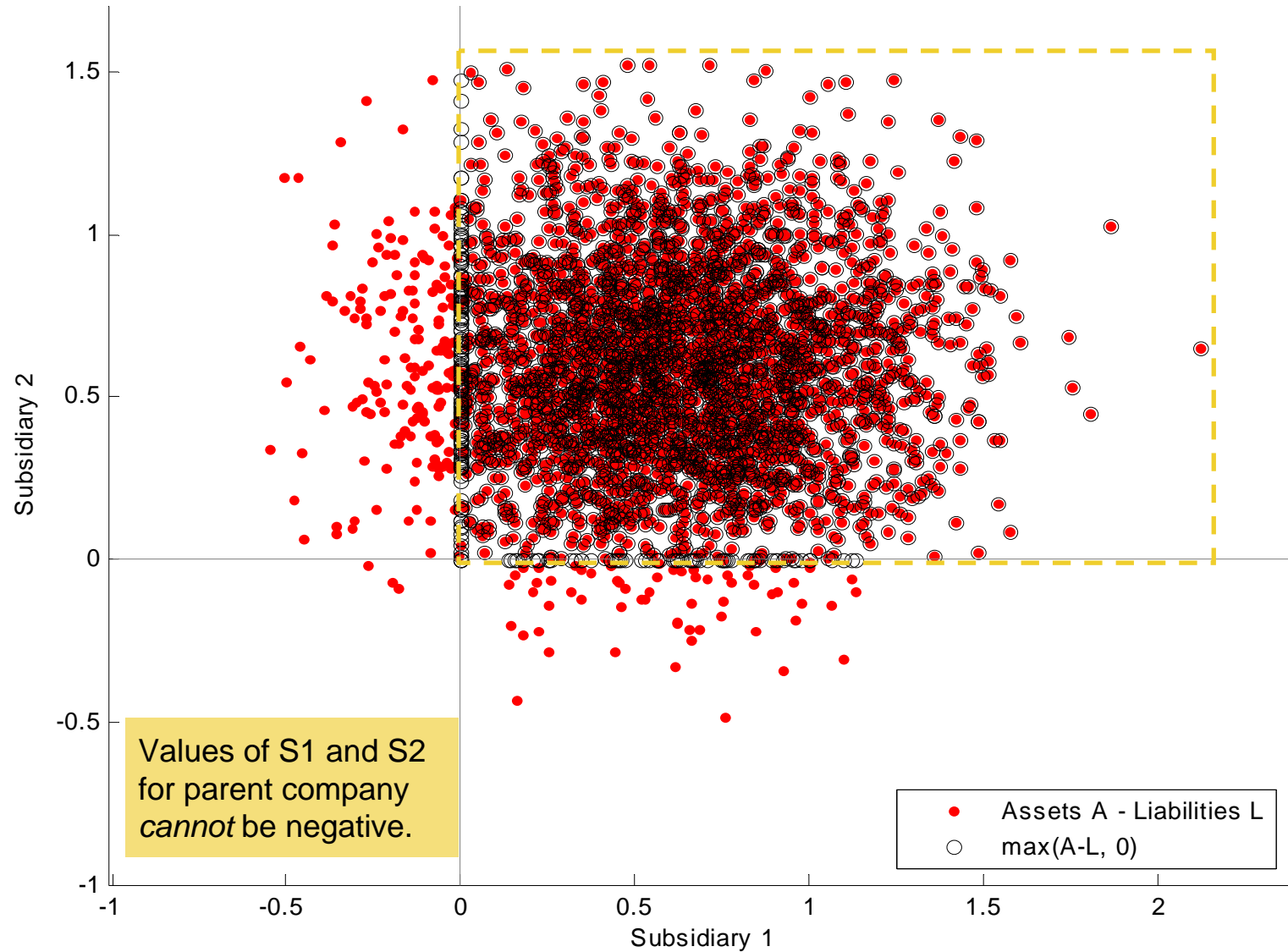
Numerical Example 1: Base Case



- Parent is a holding company
- No crti in place within the group
- Assets and liabilities of subsidiaries are independent

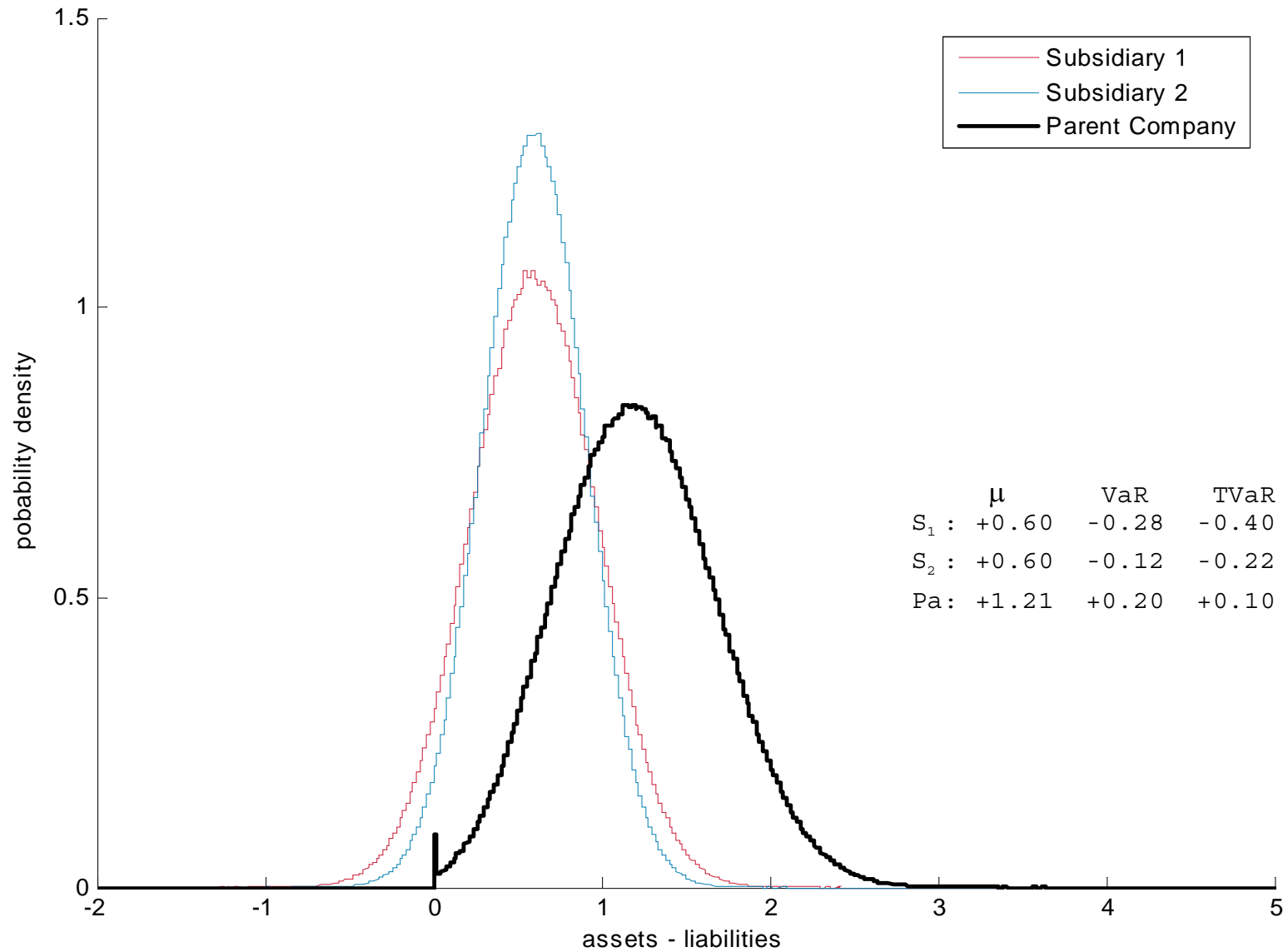


Ex 1: Values of S1 and S2



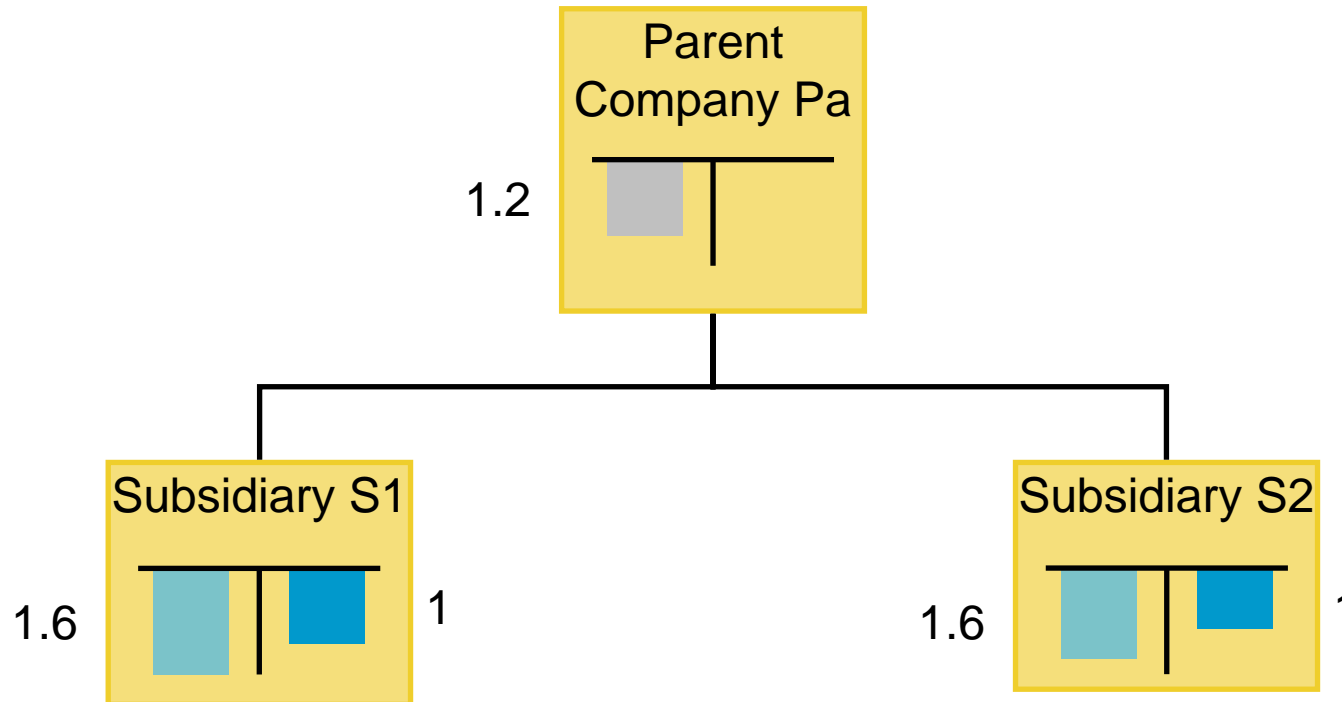


Distributions of S1, S2, and Parent





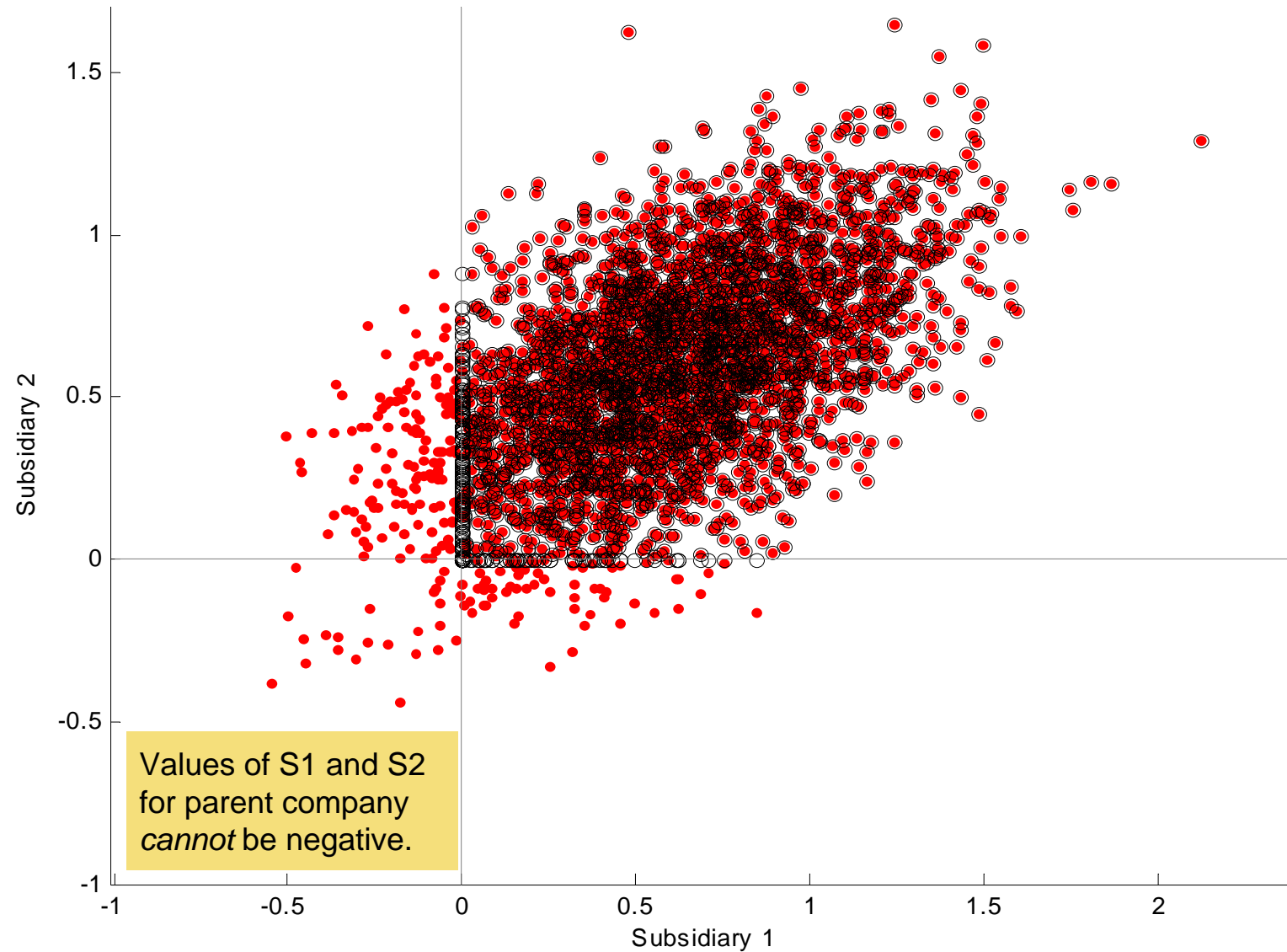
Numerical Example 2, Correlation



- Parent is a holding company
- No crti in place within the group
- Assets of subsidiaries are now correlated



Ex 2: Values of S1 and S2

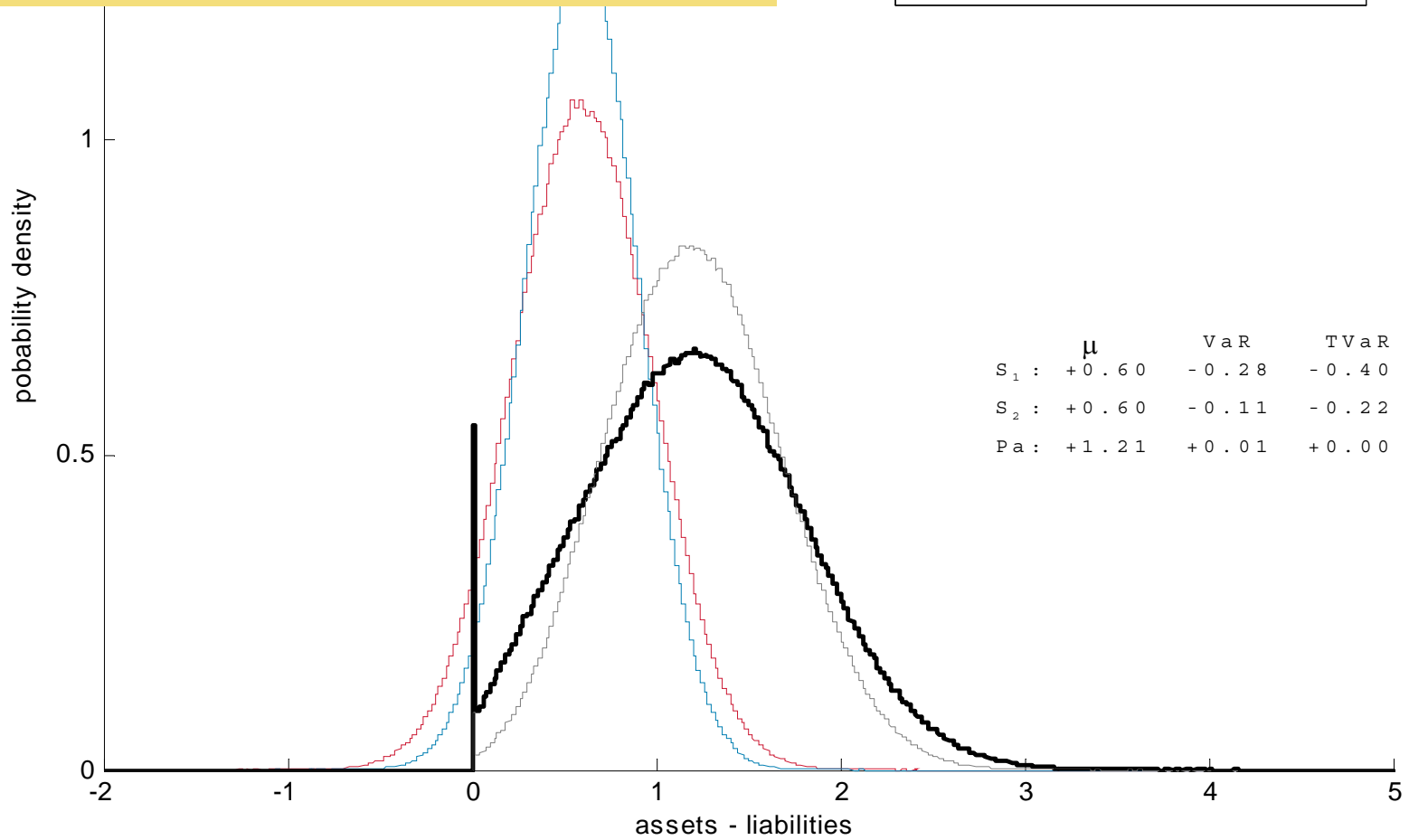
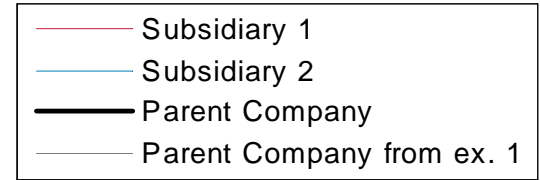




Distributions of S1, S2, and Parent

Correlation between subsidiaries:

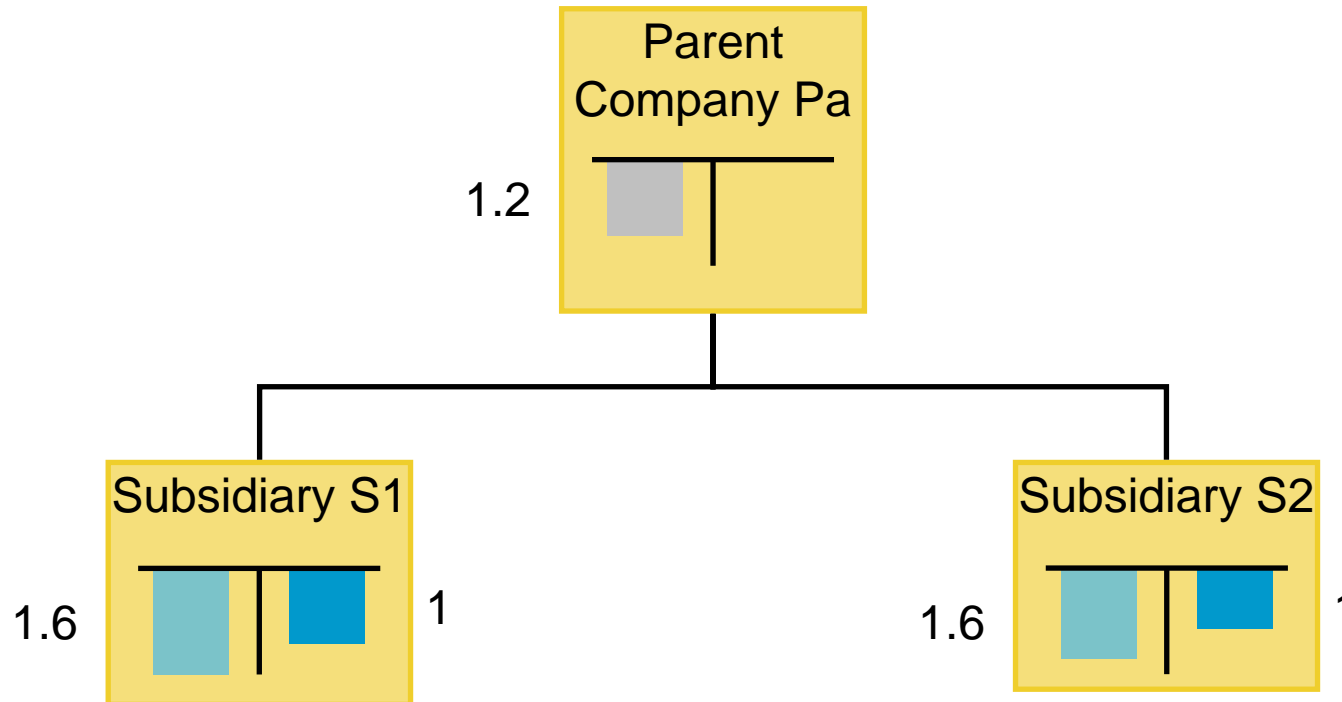
- risk of subsidiaries remains unchanged
- risk for parent increases.



| | μ | VaR | TVaR |
|-------|-------|-------|-------|
| S_1 | +0.60 | -0.28 | -0.40 |
| S_2 | +0.60 | -0.11 | -0.22 |
| Pa | +1.21 | +0.01 | +0.00 |



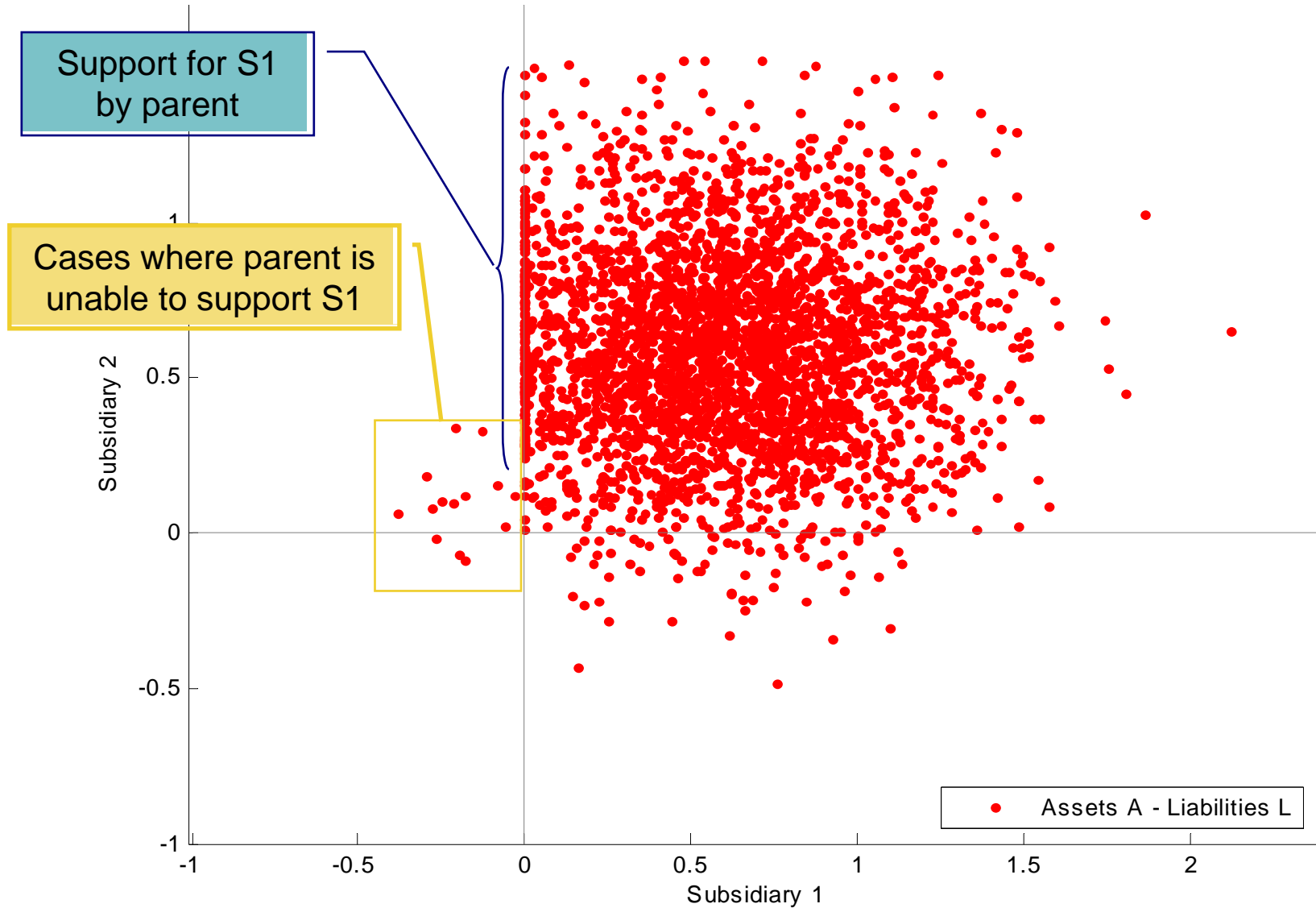
Numerical Example 3, Guarantee



- Parent gives guarantee to Subsidiary 1
- Assets and liabilities of subsidiaries are not correlated



Ex 3: Values of S1 and S2

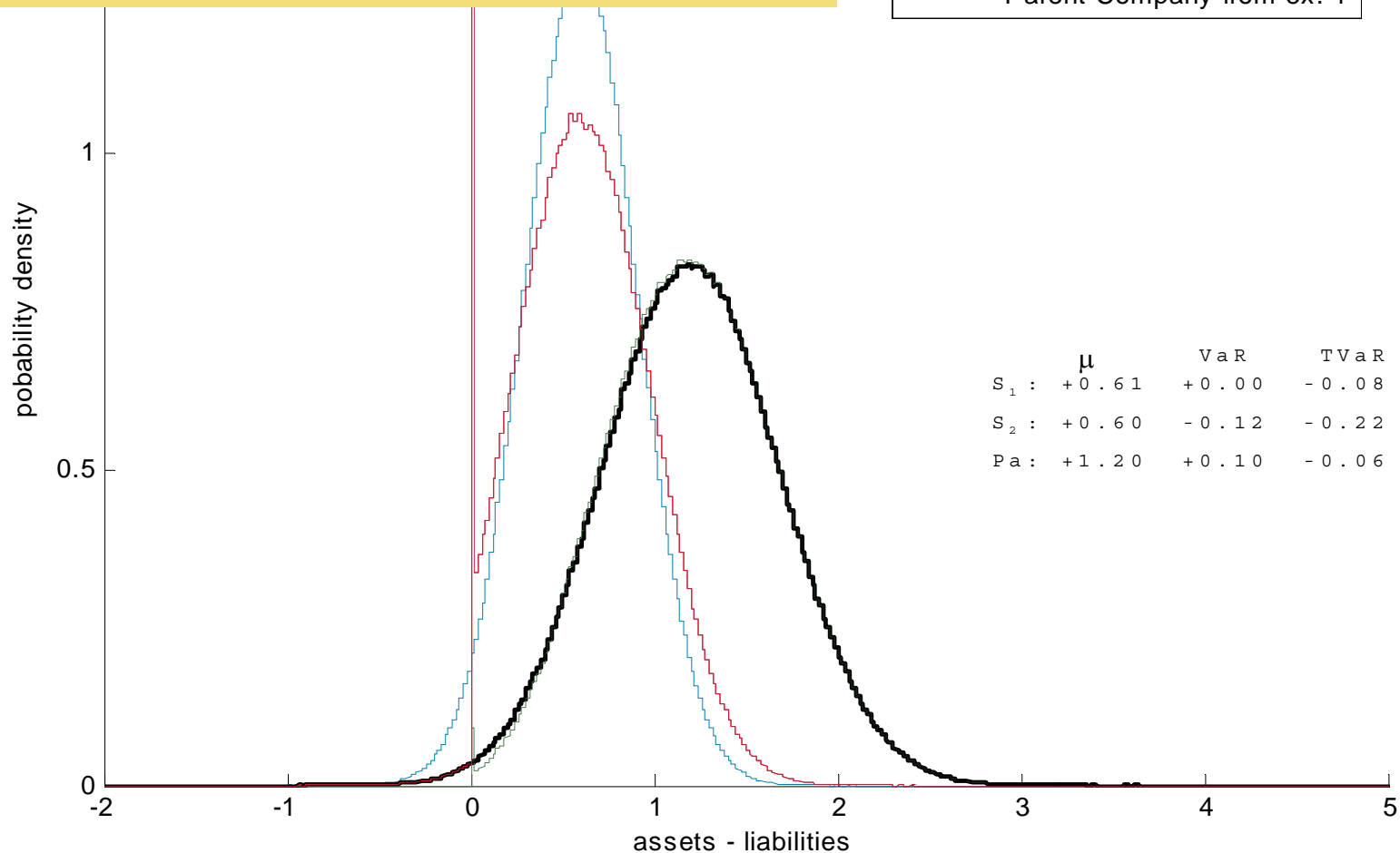
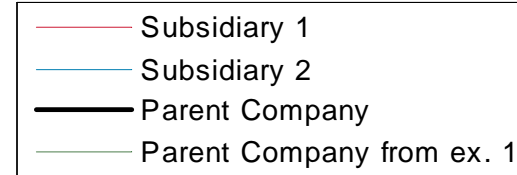




Distributions of S1, S2, and Parent

Support of S1 by parent:

- more risk for parent
- default risk for S1 remains because of credit risk.





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Prize Ceremony*

Back Up Slides
Zurich, February 26, 2008



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→ Topics
→ Swiss Solvency Test (SST)



Principle Based Supervision

Necessary skill-set of supervisors

Principle Based System:

- Specialized know-how + ability to see big picture
- Creativity
- Ability for conceptual thinking
- Ability to challenge insurers
- Communication skills
- Staff predominantly with mathematical/hard science background

FOPI increased staff with mathematical background by approx. 150% in 2005 and 2006 in order to be able to implement the new risk based supervision

Tasks for the SST

To implement the SST entail the close cooperation of different departments: actuaries, underwriting, insurance specialists, asset management, accounting, risk management, the senior management and the board of directors

