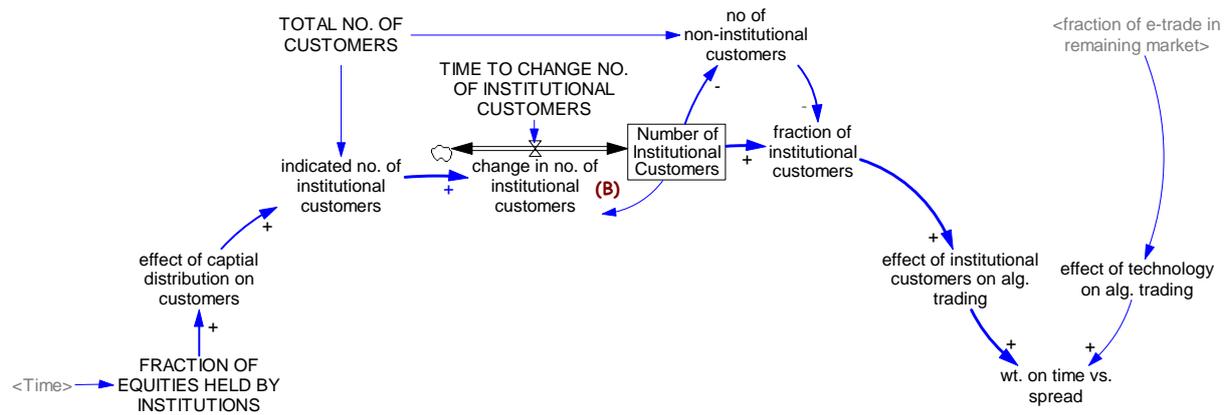


2 Appendix I: Institutional Customers



"change in no. of institutional customers"=
 ("indicated no. of institutional customers"-Number of Institutional Customers
)/"TIME TO CHANGE NO. OF INSTITUTIONAL CUSTOMERS"
 Units: entity/Year

effect of captial distribution on customers= WITH LOOKUP (
 FRACTION OF EQUITIES HELD BY INSTITUTIONS,
 [(0,0)-(1,1)],(0,0),(0.1,0.2),(0.2,0.4),(0.3,0.55),(0.4,0.66),(0.5,0.75)
 ,(0.6,0.82),(0.7,0.87),(0.8,0.9),(0.9,0.93),(1,0.95))
 Units: Dmnl

"effect of institutional customers on alg. trading"= WITH LOOKUP (
 fraction of institutional customers,
 [(0,0)-(1,1)],(0,0),(1,0.8))
 Units: Dmnl

"effect of technology on alg. trading"=
 "fraction of e-trade in remaining market"
 Units: Dmnl

FRACTION OF CAPITAL HELD BY INSTITUTIONS FROM NYSE DATA= WITH
 LOOKUP (Time, [(1960,0)-
 (2010,1)],(1960,0.15),(1970,0.282),(1990,0.414),(1992,0.417),(
 1993,0.411),(1995,0.437),(1997,0.477),(1999,0.432),(2000,0.47),(2001,0.483))
 Units: Dmnl

1970 28.20% 1950 7.20% This data is from NYSE facts and figures.
 There is not data for 1960, so I assumed 15%. Holdings of
 corporate equities in the U.S. by type of institution, (1. Okt.
 07)

"fraction of e-trade in remaining market"=
 SMOOTH3(Access to Information Technology, "TIME TO DEVELOP
 E-TRADE POSSIBILITIES")
 Units: Dmnl

FRACTION OF EQUITIES HELD BY INSTITUTIONS= WITH LOOKUP (
 Time,

(([(1960,0)-(2050,1)],(1960,0.121818),(1961,0.127039),(1962,0.12366),(1963,0.136437),(1964,0.137824),(1965,0.141924),(1966,0.150666),(1967,0.152796),(1968,0.151892),(1969,0.174399),(1970,0.185154),(1971,0.20556),(1972,0.201695),(1973,0.224875),(1974,0.258656),(1975,0.263879),(1976,0.247148),(1977,0.267071),(1978,0.290532),(1979,0.282315),(1980,0.274132),(1981,0.2911),(1982,0.324992),(1983,0.354418),(1984,0.376369),(1985,0.398256),(1986,0.374692),(1987,0.390658),(1988,0.359247),(1989,0.364516),(1990,0.375896),(1991,0.370787),(1992,0.372372),(1993,0.400006),(1994,0.422731),(1995,0.420065),(1996,0.433062),(1997,0.424297),(1998,0.433194),(1999,0.419878),(2000,0.450718),(2001,0.480608),(2002,0.508861),(2003,0.523507),(2004,0.548993),(2005,0.572488),(2006,0.587098),(2007,0.615491),(2015,0.7),(2030,0.77),(2050,0.8)))

Units: Dmnl

This is a number that relates to the percentage of shares traded by institutional customers at the NYSE (Facts and Figures > The Investing Public > Public volume on NYSE* (mils.)).

fraction of institutional customers=

Number of Institutional Customers/(Number of Institutional Customers+"no of non-institutional customers")

Units: Dmnl

"indicated no. of institutional customers"=

effect of captial distribution on customers*"TOTAL NO. OF CUSTOMERS"

Units: entity

"no of non-institutional customers"=

"TOTAL NO. OF CUSTOMERS"-Number of Institutional Customers

Units: entity

Number of Institutional Customers= INTEG (

"change in no. of institutional customers",
10)

Units: entity

"TIME TO CHANGE NO. OF INSTITUTIONAL CUSTOMERS"=

5

Units: Year

"TOTAL NO. OF CUSTOMERS"=

100

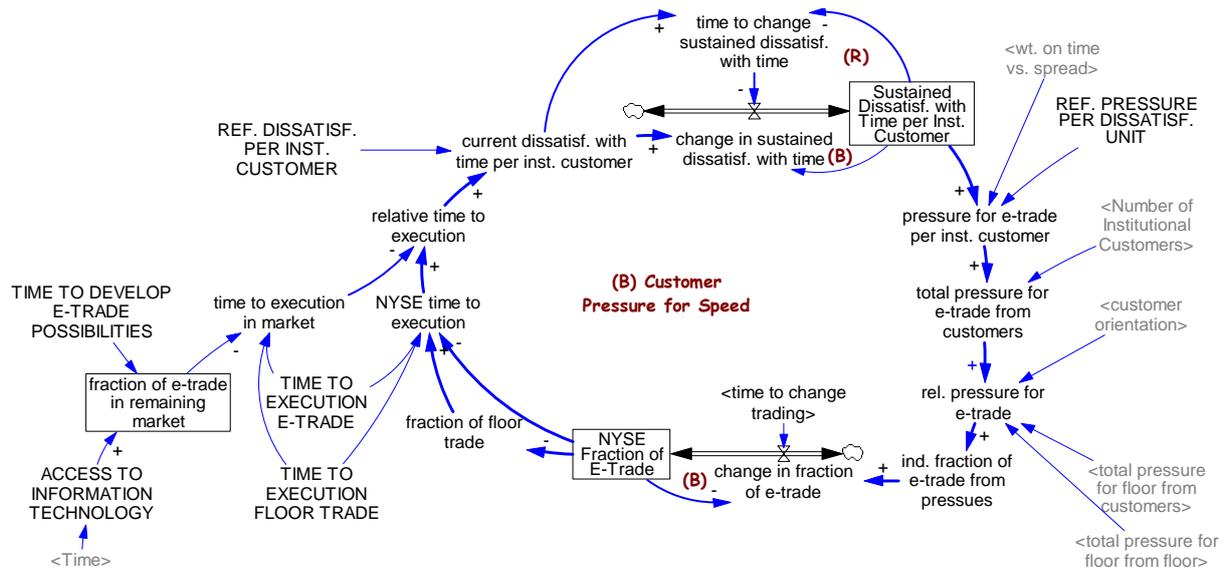
Units: entity

"wt. on time vs. spread"=

"effect of institutional customers on alg. trading"*"effect of technology on alg. trading"

Units: Dmnl

3 Appendix II: Customer Pressure for Speed



ACCESS TO INFORMATION TECHNOLOGY= WITH LOOKUP (Time, [(1960,0)-(2050,1)],(1960,0),(1975,0),(1980,0.07),(1985.44,0.16),(1990,0.5),(1995,0.9),(2000,1),(2005,1),(2010,1),(2015,1),(2050,1)) Units: Dmnl

"change in fraction of e-trade"= ("ind. fraction of e-trade from pressures"- "NYSE Fraction of E-Trade")/time to change trading Units: Dmnl/Year

"change in sustained dissatisf. with time"= ("current dissatisf. with time per inst. customer"- "Sustained Dissatisf. with Time per Inst. Customer")/"time to change sustained dissatisf. with time" Units: dissatisfaction unit/(entity*Year)

"current dissatisf. with time per inst. customer"= WITH LOOKUP (relative time to execution/"REF. DISSATISF. PER INST. CUSTOMER", [(0,0)-(10,1)],(0.9,0),(1,0),(1.2,0.3),(1.5,0.57),(2,0.75),(3,0.9),(5,0.98) ,(10,1)) Units: dissatisfaction unit/entity

customer orientation= INTEG (change in customer orientation, 0.03) Units: Dmnl

"fraction of e-trade in remaining market"= DELAY FIXED(Access to Information Technology, "Time to Develop E-Trade Possibilities", 0)

Units: Dmnl

fraction of floor trade=
1-"NYSE Fraction of E-Trade"

Units: Dmnl

"ind. fraction of e-trade from pressures"= WITH LOOKUP (
"rel. pressure for e-trade",
((0,0)-(1,1)],(0,0),(0.1,0.04),(0.2,0.1),(0.3,0.2),(0.4,0.33),(0.5,0.5),
(0.6,0.67),(0.7,0.8),(0.8,0.9),(0.9,0.96),(1,1))

Units: Dmnl

Desired fraction before implementation.

Number of Institutional Customers= INTEG (
"change in no. of institutional customers",
10)

Units: entity

This is a number that relates to the percentage of shares traded
by institutional customers at the NYSE (Facts and Figures > The
Investing Public > Public volume on NYSE* (mils.)). The dollar
value of institutional volume is even about 10% higher during
the period of 1960 to 1980 (Facts and Figures > The Investing
Public > Distribution of public volume on NYSE)

"NYSE Fraction of E-Trade"= INTEG (
"change in fraction of e-trade",
0)

Units: Dmnl

Fraction of totally automated trading that the NYSE allows for
its customers.

NYSE time to execution=

"NYSE Fraction of E-Trade"*"TIME TO EXECUTION E-TRADE"+fraction of floor
trade

*TIME TO EXECUTION FLOOR TRADE

Units: second/trade

The NYSE is now a fast market over 99% of the time, with
execution speeds in milliseconds. Reg NMS order protection rule,
http://www.nyse.com/pdfs/nyse_regnms_updates_final.pdf (7. Dez.
07). Bennett and Wei state that in 2002 the time to execution is
25 seconds on NASDAQ and 50 on the NYSE (Bennett and Wei, 2002,
pp. 64-65). The Hybrid Market will transform the NYSE from an
auction market with an average trade-execution time of 9.0
seconds to a fast market with anticipated subsecond turnaround
times.
[http://www.nyse.com/productservices/nyseequities/1126821290345.ht
ml](http://www.nyse.com/productservices/nyseequities/1126821290345.html) (30. Sep. 07)

"pressure for e-trade per inst. customer"=
"Sustained Dissatisf. with Time per Inst. Customer"*(1+0*"wt. on time vs. spread")
)*"REF. PRESSURE PER DISSATISF. UNIT"

Units: pressure unit/entity

"REF. DISSATISF. PER INST. CUSTOMER"=
1

Units: dissatisfaction unit/entity

"REF. PRESSURE PER DISSATISF. UNIT"=
1

Units: pressure unit/dissatisfaction unit

"rel. pressure for e-trade"=

"total pressure for e-trade from customers"*customer orientation/("total pressure for e-trade from customers"

*customer orientation+total pressure for floor from customers*customer orientation
+total pressure for floor from floor*(1-customer orientation))

Units: Dmnl

Describes perception: Ratio of pressures for and against
e-trade, multiplied with the weight of customer orientation.

relative time to execution=

NYSE time to execution/time to execution in market

Units: Dmnl

"Sustained Dissatisf. with Time per Inst. Customer"= INTEG (
"change in sustained dissatisf. with time",
0)

Units: dissatisfaction unit/entity

"time to change sustained dissatisf. with time"= WITH LOOKUP (
ZIDZ("current dissatisf. with time per inst. customer", "Sustained Dissatisf. with Time
per Inst. Customer"

),
((0,0)-(5,3)],(0,1),(0.5,1),(1,1.1),(1.5,1.5),(2,2.28947),(2.5,2.72368),
(3,2.90789),(4,3),(5,3)))

Units: Year

time to change trading=

effect of commitment on time to change*"REF. TIME TO CHANGE TRADING"

Units: Year

"TIME TO DEVELOP E-TRADE POSSIBILITIES"=
5

Units: Year

"TIME TO EXECUTION E-TRADE"=
1

Units: second/trade

In 2002 the Direct+ System' average time to execution was 2.5
seconds, according to NYSE Facts and Figures Facts and Figures >
Historical > NYSE Direct+. (3. Nov. 07) Now the time to
execution is 30 to 100 milliseconds. Advantages of technology

will not be taken into consideration here and a constant time to execution of 1 second is assumed.

TIME TO EXECUTION FLOOR TRADE=
9

Units: second/trade

The Hybrid Market will transform the NYSE from an auction market with an average trade-execution time of 9.0 seconds to a fast market with anticipated subsecond turnaround times.
<http://www.nyse.com/productservices/nyseequities/1126821290345.html> (30. Sep. 07)

time to execution in market=

"fraction of e-trade in remaining market"*"TIME TO EXECUTION E-TRADE"+(1-
"fraction of e-trade in remaining market"
)*TIME TO EXECUTION FLOOR TRADE

Units: second/trade

"total pressure for e-trade from customers"=

"pressure for e-trade per inst. customer"*Number of Institutional Customers
Units: pressure unit

total pressure for floor from customers=

pressure for floor per customer*"no of non-institutional customers"
Units: pressure unit

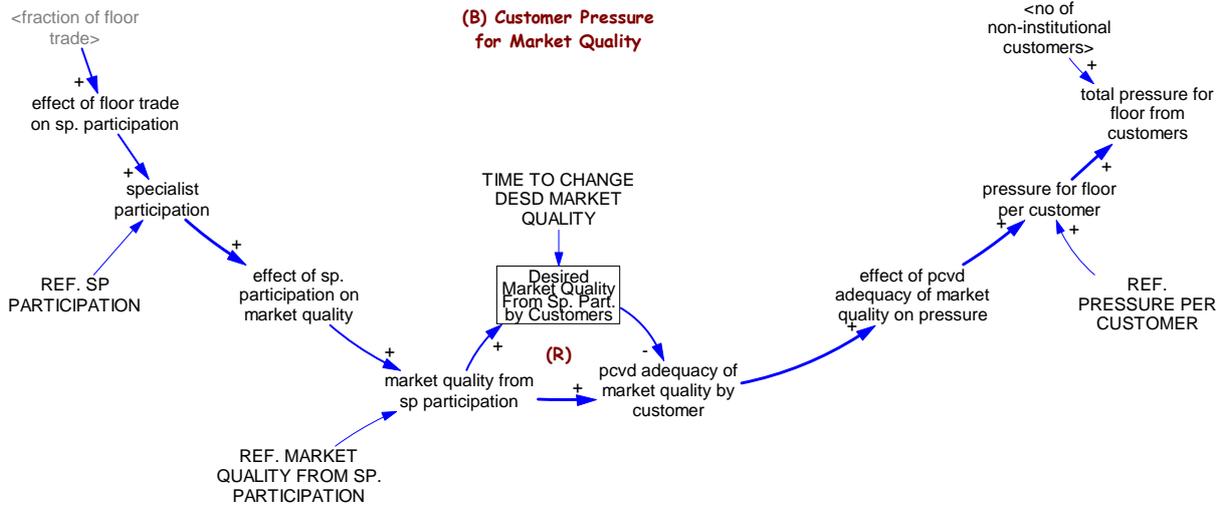
total pressure for floor from floor=

("cultural pressure for sp. system per floor firm"+"resistance pressure for sp. system
per floor firm"
)*Power of Floor Firms
Units: pressure unit

"wt. on time vs. spread"=

"effect of institutional customers on alg. trading"*"effect of technology on alg. trading"
Units: Dmnl

4 Appendix III: Customer Valuation of Floor



"Desired Market Quality From Sp. Part. by Customers"=
 SMOOTH(market quality from sp participation, TIME TO CHANGE DESD
 MARKET QUALITY)
 Units: Dmnl

"effect of floor trade on sp. participation"= WITH LOOKUP (fraction of floor trade,
 [(0,0)-(1,1)],(0,0.2),(0.04,0.26),(0.1,0.33),(0.2,0.43),(0.3,0.52),(0.4, 0.6),(0.5,0.666),(0.6,0.733),(0.7,0.8),(0.8,0.866),(0.9,0.933),(1,1))
 Units: Dmnl

It is the special feature of the Hybrid Market that even when all trades are electronic, there is some specialist participation. In general, the effect of floor trade on specialist participation grows linearly with the exception of some steeper rise at the minimum value.

effect of pcvd adequacy of market quality on pressure= WITH LOOKUP (pcvd adequacy of market quality by customer,
 [(0.95,0)-(1.05,1)],(0.95,1),(0.955,0.98),(0.96,0.95),(0.965,0.9),(0.97, 0.75),(0.975,0.5),(0.98,0.25),(0.985,0.1),(0.99,0.05),(0.995,0.02),(1,0),(1.05,0))
 Units: Dmnl

"effect of sp. participation on market quality"= WITH LOOKUP (specialist participation,
 [(0,1)-(0.1,1.1)],(0,1),(0.02,1.03421),(0.04,1.06228),(0.06,1.082),(0.08 ,1.09386),(0.1,1.1))
 Units: Dmnl

The curve is concave due to the diminishing marginal utility of specialist participation. This non-linear relationship bases on the assumption that there is an absolute limit to the effect that specialist participation can have on market quality. This value always depends on the specific security, but on average I assume that specialist involvement is needed in not more than 10 to 15 percent of trades.

fraction of floor trade=
 1-"NYSE Fraction of E-Trade"

Units: Dmnl

market quality from sp participation=
"effect of sp. participation on market quality"*"REF. MARKET QUALITY FROM
SP. PARTICIPATION"

Units: Dmnl

Volatility 11.33 pre hybrid, and 12.12 since hybrid, units are 5
min/bps, Nyse Group (2007) NYSE completes Hyb. Mark. phase III
activation.

"no of non-institutional customers"=
"TOTAL NO. OF CUSTOMERS"-Number of Institutional Customers

Units: entity

pcvd adequacy of market quality by customer=
market quality from sp participation/"Desired Market Quality From Sp. Part. by Cus-
tomers"

Units: Dmnl

pressure for floor per customer=
effect of pcvd adequacy of market quality on pressure*"REF. PRESSURE PER CUS-
TOMER"

Units: pressure unit/entity

"REF. MARKET QUALITY FROM SP. PARTICIPATION"=
1

Units: Dmnl

"REF. PRESSURE PER CUSTOMER"=
1

Units: pressure unit/entity

"REF. SP PARTICIPATION"=
0.1

Units: Dmnl

specialist participation=
"effect of floor trade on sp. participation"*"REF. SP PARTICIPATION"

Units: Dmnl

31. Dec. 2005, floor trades 90% of volume (probably 80% of trades), specialist participation
8.3%. 1. Mar. 2007, floor trades 10% of trades, 20% of volume, specialist participa-
tion 3.3%. Beginning 2008, floor trades 4%, specialist participation 2,6%.

TIME TO CHANGE DESD MARKET QUALITY=
10

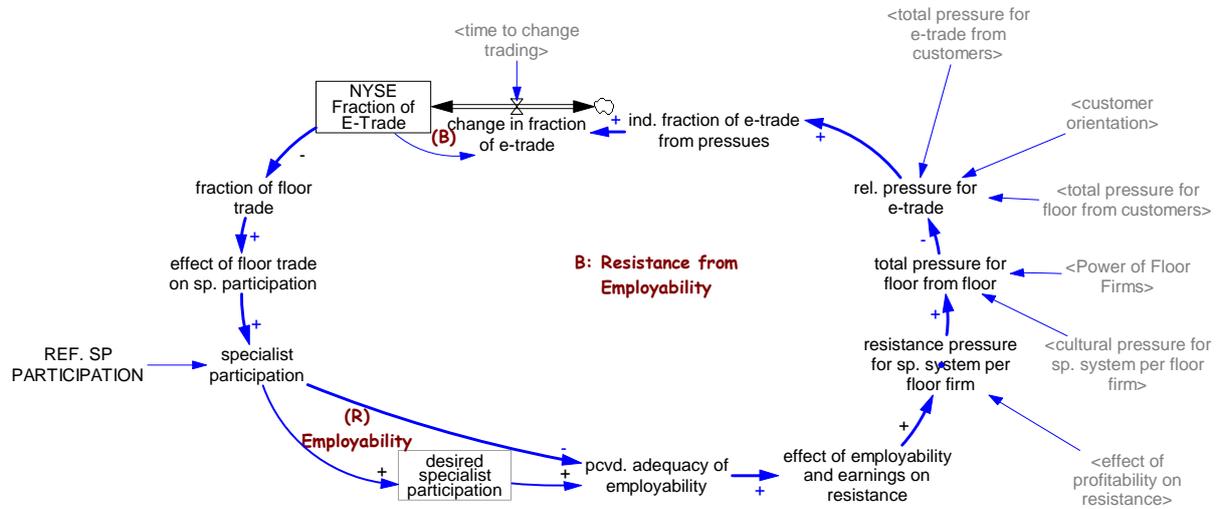
Units: Year

total pressure for floor from customers=
pressure for floor per customer*"no of non-institutional customers"

Units: pressure unit

5 Appendix IV: Resistance Pressure

Resistance from Employability Gap



"change in fraction of e-trade"=
 ("ind. fraction of e-trade from pressures"- "NYSE Fraction of E-Trade")/time to
 change trading
 Units: Dmnl/Year

"cultural pressure for sp. system per floor firm"=
 "Valuation of Sp. Culture per Floor Firm"*DEGREE OF COHESIVENESS OF
 FLOOR FIRMS*"REF. CULTURAL PRESSURE PER FLOOR FIRM"
 Units: pressure unit/entity

customer orientation= INTEG (
 change in customer orientation,
 0.03)
 Units: Dmnl

desired specialist participation=
 SMOOTH(specialist participation, TIME TO ADJUST DESIRED PARTICIPATION)
 Units: Dmnl

effect of employability and earnings on resistance= WITH LOOKUP (
 "pcvd. adequacy of employability",
 ((0,0)-(2,1)],(0.3,1),(0.5,1),(0.6,0.97),(0.7,0.88),(0.8,0.6),(0.9,0.15)
 ,(0.95,0.03),(1,0),(1.1,0))
 Units: Dmnl

"effect of floor trade on sp. participation"= WITH LOOKUP (
 fraction of floor trade,
 ((0,0)-(1,1)],(0,0.2),(0.04,0.26),(0.1,0.33),(0.2,0.43),(0.3,0.52),(0.4,
 0.6),(0.5,0.666),(0.6,0.733),(0.7,0.8),(0.8,0.866),(0.9,0.933),(1,1))
 Units: Dmnl

It is the special feature of the Hybrid Market that even when
 all trades are electronic, there is some specialist
 participation. In general, the effect of floor trade on
 specialist participation grows linearly with the exception of

some steeper rise at the minimum value.

effect of profitability on resistance= WITH LOOKUP (
"pcvd. adequacy of profitability",
([(0.3,0)-(1.1,1)],(0.3,1),(0.5,1),(0.6,0.97),(0.7,0.88),(0.8,0.6),(0.9,0.15
) ,(0.95,0.03),(1,0),(1.1,0)))

Units: Dmnl

fraction of floor trade=
1-"NYSE Fraction of E-Trade"

Units: Dmnl

"ind. fraction of e-trade from pressures"= WITH LOOKUP (
"rel. pressure for e-trade",
([(0,0)-(1,1)],(0,0),(0.1,0.04),(0.2,0.1),(0.3,0.2),(0.4,0.33),(0.5,0.5),
(0.6,0.67),(0.7,0.8),(0.8,0.9),(0.9,0.96),(1,1)))

Units: Dmnl

Desired fraction before implementation.

"NYSE Fraction of E-Trade"= INTEG (
"change in fraction of e-trade",
0)

Units: Dmnl

Fraction of totally automated trading that the NYSE allows for its customers.

"pcvd. adequacy of employability"=
specialist participation/desired specialist participation

Units: Dmnl

Power of Floor Firms= INTEG (
change in power of floor firms,
"REF. POWER OF FLOOR FIRMS")

Units: entity

"REF. RESISTANCE PRESSURE PER FLOOR FIRM"=
0.3

Units: pressure unit/entity

"REF. SP PARTICIPATION"=
0.1

Units: Dmnl

"rel. pressure for e-trade"=
"total pressure for e-trade from customers"*customer orientation/("total pressure for e-
trade from customers"

*customer orientation+total pressure for floor from customers*customer orientation
+total pressure for floor from floor*(1-customer orientation))

Units: Dmnl

Describes perception: Ratio of pressures for and against e-trade, multiplied with the weight of
customer orientation.

"resistance pressure for sp. system per floor firm"=
(effect of employability and earnings on resistance*effect of profitability on resistance
)*"REF. RESISTANCE PRESSURE PER FLOOR FIRM"
Units: pressure unit/entity

specialist participation=
"effect of floor trade on sp. participation"*"REF. SP PARTICIPATION"
Units: Dmnl
31. Dec. 2005, floor trades 90% of volume (probably 80% of
trades), specialist participation 8.3%. 1. Mar. 2007, floor
trades 10% of trades, 20% of volume, specialist participation
3.3%. Beginning 2008, floor trades 4%, specialist participation
2,6%.

TIME TO ADJUST DESIRED PARTICIPATION=
3
Units: Year

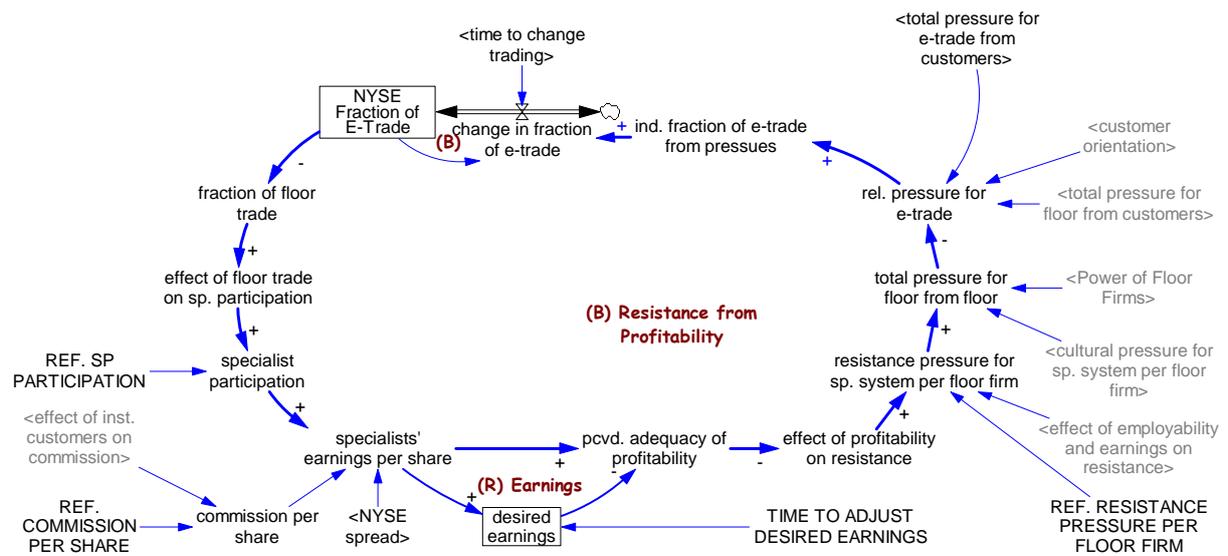
time to change trading=
effect of commitment on time to change*"REF. TIME TO CHANGE TRADING"
Units: Year

"total pressure for e-trade from customers"=
"pressure for e-trade per inst. customer"*Number of Institutional Customers
Units: pressure unit

total pressure for floor from customers=
pressure for floor per customer*"no of non-institutional customers"
Units: pressure unit

total pressure for floor from floor=
("cultural pressure for sp. system per floor firm"+"resistance pressure for sp. system
per floor firm"
)*Power of Floor Firms
Units: pressure unit

Resistance from Earnings Gap



"change in fraction of e-trade"=
 ("ind. fraction of e-trade from pressues"- "NYSE Fraction of E-Trade")/time to
 change trading
 Units: Dmnl/Year

commission per share=
 "REF. COMMISSION PER SHARE"*"effect of inst. customers on commission"
 Units: \$/share

NYSE's 5-cent net charge for 100 shares of an NYSE-listed stock.
<http://www.rblt.com/documents/Bloombergnews9-8-06.pdf> (8. Nov.
 07); According to Facts and Figures, commissions where 0.1% in
 1962, Minimum commission charges on stocks - examples;

"cultural pressure for sp. system per floor firm"=
 "Valuation of Sp. Culture per Floor Firm"*DEGREE OF COHESIVENESS OF
 FLOOR FIRMS
 *"REF. CULTURAL PRESSURE PER FLOOR FIRM"
 Units: pressure unit/entity

customer orientation= INTEG (
 change in customer orientation,
 0.03)
 Units: Dmnl

desired earnings=
 SMOOTH(specialists' earnings per share, TIME TO ADJUST DESIRED EARNINGS)
 Units: \$/share

effect of employability and earnings on resistance= WITH LOOKUP (
 "pcvd. adequacy of employability",
 [(0,0)-(2,1)],(0.3,1),(0.5,1),(0.6,0.97),(0.7,0.88),(0.8,0.6),(0.9,0.15)
 ,(0.95,0.03),(1,0),(1.1,0))
 Units: Dmnl

"effect of floor trade on sp. participation"= WITH LOOKUP (fraction of floor trade, ((0,0)-(1,1)],(0,0.2),(0.04,0.26),(0.1,0.33),(0.2,0.43),(0.3,0.52),(0.4,0.6),(0.5,0.666),(0.6,0.733),(0.7,0.8),(0.8,0.866),(0.9,0.933),(1,1)))

Units: Dmnl

It is the special feature of the Hybrid Market that even when all trades are electronic, there is some specialist participation. In general, the effect of floor trade on specialist participation grows linearly with the exception of some steeper rise at the minimum value.

"effect of inst. customers on commission"= WITH LOOKUP (Number of Institutional Customers, ((0,0)-(100,1)],(10,1),(25,0.95),(60,0.15),(80,0.01),(100,0)))

Units: Dmnl

effect of profitability on resistance= WITH LOOKUP ("pcvd. adequacy of profitability", ((0.3,0)-(1.1,1)],(0.3,1),(0.5,1),(0.6,0.97),(0.7,0.88),(0.8,0.6),(0.9,0.15),(0.95,0.03),(1,0),(1.1,0)))

Units: Dmnl

fraction of floor trade= 1-"NYSE Fraction of E-Trade"

Units: Dmnl

"ind. fraction of e-trade from pressures"= WITH LOOKUP ("rel. pressure for e-trade", ((0,0)-(1,1)],(0,0),(0.1,0.04),(0.2,0.1),(0.3,0.2),(0.4,0.33),(0.5,0.5),(0.6,0.67),(0.7,0.8),(0.8,0.9),(0.9,0.96),(1,1)))

Units: Dmnl

Desired fraction before implementation.

"NYSE Fraction of E-Trade"= INTEG ("change in fraction of e-trade", 0)

Units: Dmnl

Fraction of totally automated trading that the NYSE allows for its customers.

NYSE spread=

"REF. SPREAD"*effect of NYSE trading volume on NYSE spread*"effect of inst. customers on spread"

Units: \$/share

THE SPREAD IS THE DIFFERENCE BETWEEN BID AND ASK PRICE. and reduced volatility was the key criterion of market quality. http://www.nyse.com/pdfs/hm_booklet.pdf (30. Sep. 07) NYSE Hybrid Market Training Program. quoted spread pre hybrid 20.95, since hybrid 18.32, effective spread pre hybrid 7.50, since hybrid 8.17 bps, Nyse Group (2007) NYSE completes Hyb. Mark. phase III activation Now the effective spread is about 2 ct,

which is 5 bpt * 40 USD avg. share price.

"pcvd. adequacy of profitability"=
specialists' earnings per share/desired earnings
Units: Dmnl

Power of Floor Firms= INTEG (
change in power of floor firms,
"REF. POWER OF FLOOR FIRMS")
Units: entity

"REF. COMMISSION PER SHARE"=
0.05
Units: \$/share

"REF. RESISTANCE PRESSURE PER FLOOR FIRM"=
0.3
Units: pressure unit/entity

"REF. SP PARTICIPATION"=
0.1
Units: Dmnl

"rel. pressure for e-trade"=
"total pressure for e-trade from customers"*customer orientation/("total pressure for e-
trade from customers"
*customer orientation+total pressure for floor from customers*customer orientation
+total pressure for floor from floor*(1-customer orientation))
Units: Dmnl
Describes perception: Ratio of pressures for and against
e-trade, multiplied with the weight of customer orientation.

"resistance pressure for sp. system per floor firm"=
(effect of employability and earnings on resistance*effect of profitability on resistance
)*"REF. RESISTANCE PRESSURE PER FLOOR FIRM"
Units: pressure unit/entity

specialist participation=
"effect of floor trade on sp. participation"*"REF. SP PARTICIPATION"
Units: Dmnl

31. Dec. 2005, floor trades 90% of volume (probably 80% of
trades), specialist participation 8.3%. 1. Mar. 2007, floor
trades 10% of trades, 20% of volume, specialist participation
3.3%. Beginning 2008, floor trades 4%, specialist participation
2,6%.

specialists' earnings per share=
commission per share+NYSE spread*specialist participation
Units: \$/share

TIME TO ADJUST DESIRED EARNINGS=

3

Units: Year

time to change trading=

effect of commitment on time to change*"REF. TIME TO CHANGE TRADING"

Units: Year

"total pressure for e-trade from customers"=

"pressure for e-trade per inst. customer"*Number of Institutional Customers

Units: pressure unit

total pressure for floor from customers=

pressure for floor per customer*"no of non-institutional customers"

Units: pressure unit

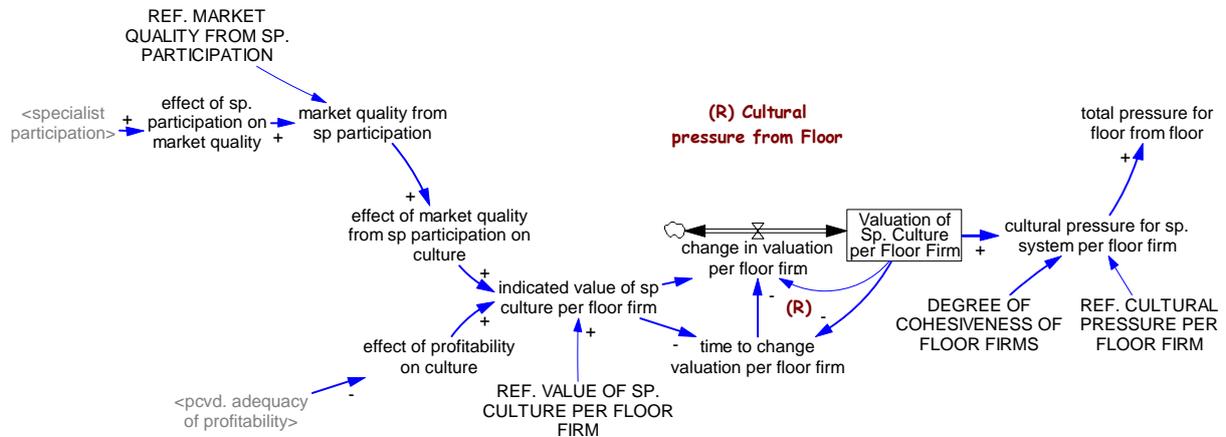
total pressure for floor from floor=

("cultural pressure for sp. system per floor firm"+"resistance pressure for sp. system
per floor firm"

)*Power of Floor Firms

Units: pressure unit

6 Appendix V: Floor Valuation of Floor Culture



change in valuation per floor firm=
 (indicated value of sp culture per floor firm-"Valuation of Sp. Culture per Floor Firm")/time to change valuation per floor firm
 Units: valuation unit/entity/Year

"cultural pressure for sp. system per floor firm"=
 "Valuation of Sp. Culture per Floor Firm"*DEGREE OF COHESIVENESS OF FLOOR FIRMS
 *"REF. CULTURAL PRESSURE PER FLOOR FIRM"
 Units: pressure unit/entity

DEGREE OF COHESIVENESS OF FLOOR FIRMS=
 0.7
 Units: Dmnl

effect of market quality from sp participation on culture= WITH LOOKUP (market quality from sp participation, ((1,0)-(1.1,0.5)],(1,0),(1.02,0.210526),(1.04,0.328947),(1.06,0.41886),(1.08,0.475877),(1.1,0.5)))
 Units: Dmnl

effect of profitability on culture= WITH LOOKUP ("pcvd. adequacy of profitability", ((0,0)-(2,0.6)],(0,0),(0.3,0.05),(0.5,0.15),(0.6,0.25),(0.7,0.35),(0.8,0.425),(0.9,0.475),(1,0.5),(1.5,0.5)))
 Units: Dmnl

"effect of sp. participation on market quality"= WITH LOOKUP (specialist participation, ((0,1)-(0.1,1.1)],(0,1),(0.02,1.03421),(0.04,1.06228),(0.06,1.082),(0.08,1.09386),(0.1,1.1)))
 Units: Dmnl

The curve is concave due to the diminishing marginal utility of specialist participation. This non-linear relationship bases on

the assumption that there is an absolute limit to the effect that specialist participation can have on market quality. This value always depends on the specific security, but on average I assume that specialist involvement is needed in not more than 10 to 15 percent of trades.

indicated value of sp culture per floor firm=
 (effect of profitability on culture+effect of market quality from sp participation on culture)
)*"REF. VALUE OF SP. CULTURE PER FLOOR FIRM"
 Units: valuation unit/entity

market quality from sp participation=
 "effect of sp. participation on market quality"*"REF. MARKET QUALITY FROM SP. PARTICIPATION"
 Units: Dmnl
 Volatility 11.33 pre hybrid, and 12.12 since hybrid, units are 5 min/bps, Nyse Group (2007) NYSE completes Hyb. Mark. phase III activation.

"pcvd. adequacy of profitability"=
 specialists' earnings per share/desired earnings
 Units: Dmnl

"REF. CULTURAL PRESSURE PER FLOOR FIRM"=
 1
 Units: pressure unit/valuation unit

"REF. MARKET QUALITY FROM SP. PARTICIPATION"=
 1
 Units: Dmnl

"REF. VALUE OF SP. CULTURE PER FLOOR FIRM"=
 0.5
 Units: valuation unit/entity

specialist participation=
 "effect of floor trade on sp. participation"*"REF. SP PARTICIPATION"
 Units: Dmnl
 31. Dec. 2005, floor trades 90% of volume (probably 80% of trades), specialist participation 8.3%. 1. Mar. 2007, floor trades 10% of trades, 20% of volume, specialist participation 3.3%. Beginning 2008, floor trades 4%, specialist participation 2,6%.

time to change valuation per floor firm= WITH LOOKUP (
 ZIDZ(indicated value of sp culture per floor firm,"Valuation of Sp. Culture per Floor Firm"
),
 ((0,0)-(2,25)],(0,25),(0.35,24),(0.666667,22),(0.88,18.5),(0.98,12.5),(1,8),(1.1,6),(1.5,3),(1.75,2.5),(2,2.5))

Units: Year

total pressure for floor from floor=

("cultural pressure for sp. system per floor firm"+"resistance pressure for sp. system
per floor firm"

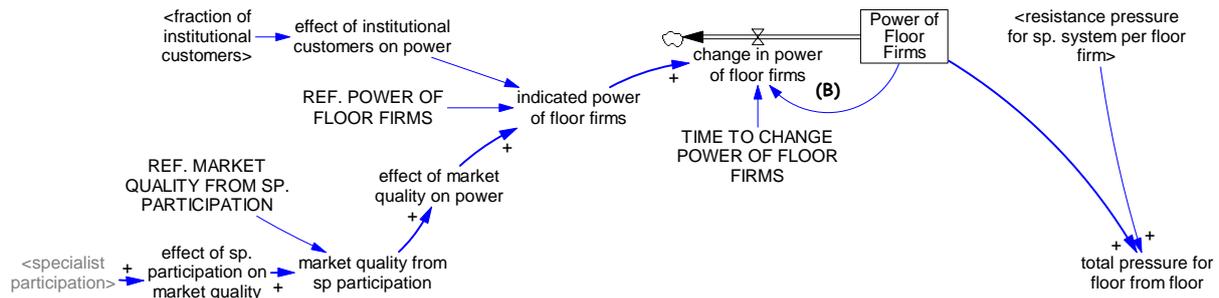
)*Power of Floor Firms

Units: pressure unit

"Valuation of Sp. Culture per Floor Firm"= INTEG (
change in valuation per floor firm,
1)

Units: valuation unit/entity

7 Appendix VI: Power of Floor Firms



change in power of floor firms=
 (indicated power of floor firms-Power of Floor Firms)/TIME TO CHANGE
 POWER OF FLOOR FIRMS
 Units: entity/Year

effect of institutional customers on power= WITH LOOKUP (
 fraction of institutional customers,
 [(0,0)-(1,1)],(0,1),(0.2,0.98),(0.4,0.95),(0.6,0.85),(0.8,0.65),(1,0.33)
))
 Units: Dmnl

effect of market quality on power= WITH LOOKUP (
 market quality from sp participation,
 [(1,0)-(1.1,1)],(1,0),(1.02,0.07),(1.04,0.3),(1.06,0.7),(1.08,0.93),(1.1
 ,1))
 Units: Dmnl

"effect of sp. participation on market quality"= WITH LOOKUP (
 specialist participation,
 [(0,1)-(0.1,1.1)],(0,1),(0.02,1.03421),(0.04,1.06228),(0.06,1.082),(0.08
 ,1.09386),(0.1,1.1))
 Units: Dmnl

The curve is concave due to the diminishing marginal utility of specialist participation. This non-linear relationship bases on the assumption that there is an absolute limit to the effect that specialist participation can have on market quality. This value always depends on the specific security, but on average I assume that specialist involvement is needed in not more than 10 to 15 percent of trades.

fraction of institutional customers=
 Number of Institutional Customers/(Number of Institutional Customers+"no of non-
 institutional customers"
)
 Units: Dmnl

indicated power of floor firms=
 effect of market quality on power*effect of institutional customers on power
 *"REF. POWER OF FLOOR FIRMS"
 Units: entity

market quality from sp participation=
"effect of sp. participation on market quality"*"REF. MARKET QUALITY FROM
SP. PARTICIPATION"

Units: Dmnl

Volatility 11.33 pre hybrid, and 12.12 since hybrid, units are 5
min/bps, Nyse Group (2007) NYSE completes Hyb. Mark. phase III
activation.

Power of Floor Firms= INTEG (
change in power of floor firms,
"REF. POWER OF FLOOR FIRMS")

Units: entity

"REF. MARKET QUALITY FROM SP. PARTICIPATION"=
1

Units: Dmnl

"REF. POWER OF FLOOR FIRMS"=
100

Units: entity

The reference power of floor firms is 100. It equals the total
power of customers--allowing for two theoretically equally
powerful groups. Their power balance shifts endogenously over
time.

"resistance pressure for sp. system per floor firm"=
(effect of employability and earnings on resistance*effect of profitability on resistance
)*"REF. RESISTANCE PRESSURE PER FLOOR FIRM"

Units: pressure unit/entity

specialist participation=
"effect of floor trade on sp. participation"*"REF. SP PARTICIPATION"

Units: Dmnl

31. Dec. 2005, floor trades 90% of volume (probably 80% of
trades), specialist participation 8.3%. 1. Mar. 2007, floor
trades 10% of trades, 20% of volume, specialist participation
3.3%. Beginning 2008, floor trades 4%, specialist participation
2,6%.

TIME TO CHANGE POWER OF FLOOR FIRMS=
5

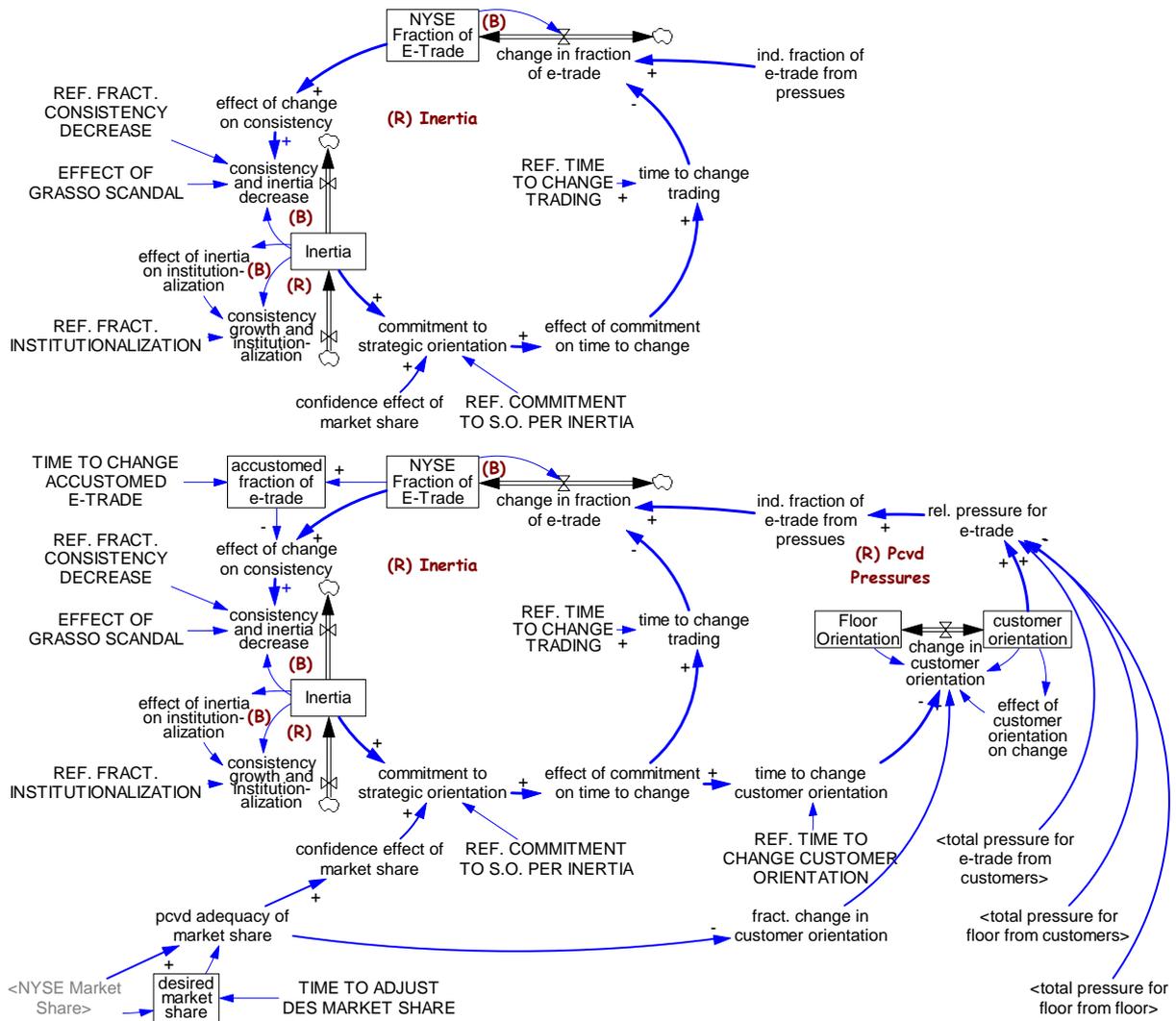
Units: Year

total pressure for floor from floor=
("cultural pressure for sp. system per floor firm"+"resistance pressure for sp. system
per floor firm"

)*Power of Floor Firms

Units: pressure unit

8 Appendix VII: Management Decision-Making



"accustomed fraction of e-trade"=
 $\text{SMOOTH}(\text{"NYSE Fraction of E-Trade"}, \text{"TIME TO CHANGE ACCUS- TOMED E-TRADE"})$
 Units: Dmnl

change in customer orientation=
 $\text{customer orientation} * \text{Floor Orientation} * \text{"fract. change in customer orientation"}$
 *effect of customer orientation on change/time to change customer orientation
 Units: Dmnl/Year

"change in fraction of e-trade"=
 $(\text{"ind. fraction of e-trade from pressues"} - \text{"NYSE Fraction of E-Trade"}) / \text{time to change trading}$
 Units: Dmnl/Year

commitment to strategic orientation=
 $\text{Inertia} * \text{confidence effect of market share} * \text{"REF. COMMITMENT TO S.O. PER IN- ERTIA"}$
 Units: Dmnl

confidence effect of market share= WITH LOOKUP (

pcvd adequacy of market share,

((0,0)-(1.2,1)],(0,0),(0.1,0.01),(0.2,0.03),(0.3,0.07),(0.4,0.12),(0.5,0.2

) ,(0.6,0.3),(0.7,0.55),(0.8,0.85),(0.9,0.95),(1,1),(1.2,1)))

Units: Dmnl

consistency and inertia decrease=

Inertia*"REF. FRACT. CONSISTENCY DECREASE"*effect of change on consis-

tency

*EFFECT OF GRASSO SCANDAL

Units: consistency unit/Year

"consistency growth and institution- alization"=

"effect of inertia on institution- alization"*"REF. FRACT. INSTITUTIONALIZA-

TION"

*Inertia

Units: consistency unit/Year

customer orientation= INTEG (

change in customer orientation,

0.03)

Units: Dmnl

desired market share=

SMOOTH(NYSE Market Share, TIME TO ADJUST DES MARKET SHARE)

Units: Dmnl

effect of change on consistency= WITH LOOKUP (

"NYSE Fraction of E-Trade"- "accustomed fraction of e-trade",

((-1,0)-(1,10)],(-1,6.5),(-0.7,6.5),(-0.5,6),(-0.3,4.2),(-0.2,2.7),(-0.1

,1.3),(0,1),(0.1,1.3),(0.2,2.7),(0.3,4.2),(0.5,6),(0.7,6.5),(1,6.5)))

Units: Dmnl

Small changes have an underproportional effect on consistency loss. This allows an organization to change very slowly without disruption in its internal consistency. This can be compared to the normal and extreme turnover rates. Yet, consistency also captures changes in the people's thinking even if they remain in the organization. According to the Bureau of Labor Statistics, the turnover rate in 2007, a turbulent year in the financial industry, was about 30%. This compares to turbulent years of change at the NYSE. Thus, radical change multiplies the reference consistency decrease of 9.2%/year by a factor of about 3-6.

effect of commitment on time to change= WITH LOOKUP (

commitment to strategic orientation,

((0,0)-(2,10)],(0,1),(0.2,1.05),(0.4,1.35),(0.5,1.8),(0.6,2.8),(0.7,4),(

0.8,4.5),(0.9,4.9),(1,5)))

Units: Dmnl

effect of customer orientation on change= WITH LOOKUP (

customer orientation,

(((0,0)-(1,1)],(0.97,1),(0.975,0),(0.98,0),(0.985,0),(0.99,0),(1,0)))

Units: Dmnl

EFFECT OF GRASSO SCANDAL=

1+PULSE(2003, 1)*5*0

Units: Dmnl

"effect of inertia on institution- alization"= WITH LOOKUP (

Inertia,

(((0,0)-(1,1)],(0,1),(0.7,1),(0.8,0.99),(0.9,0.9),(0.95,0.75),(0.98,0.5),
(0.99,0.3),(1,0)))

Units: Dmnl

The more the organization is consistent, the more consistency
growth slows down.

Floor Orientation= INTEG (

-change in customer orientation,
0.97)

Units: Dmnl

"fract. change in customer orientation"= WITH LOOKUP (

pcvd adequacy of market share,
(((0,0)-(1.2,3)],(0,2.6),(0.2,2.6),(0.4,2.5),(0.6,2.25),(0.8,1.8),(0.9,1.1
) ,(0.95,0.4),(1,0),(1.2,0)))

Units: Dmnl

"ind. fraction of e-trade from pressues"= WITH LOOKUP (

"rel. pressure for e-trade",
(((0,0)-(1,1)],(0,0),(0.1,0.04),(0.2,0.1),(0.3,0.2),(0.4,0.33),(0.5,0.5),
(0.6,0.67),(0.7,0.8),(0.8,0.9),(0.9,0.96),(1,1)))

Units: Dmnl

Desired fraction before implementation.

"ind. fraction of e-trade"= WITH LOOKUP (

"rel. pressure for e-trade test",
([(-100,0)-(100,1)],(-100,0),(-60,0),(-40,0),(-30,0.02),(-20,0.15),(0,0.5
) ,(20,0.85),(30,0.96),(40,0.99),(60,1),(100,1
)))

Units: Dmnl

Inertia= INTEG (

"consistency growth and institution- alization"-consistency and inertia decrease
,
0.966)

Units: consistency unit

Initial value = effect of (ref. fract. consistency decrease /
ref. fract. institutionalization) = 0.966

net pressure=

"total pressure for e-trade from customers"*customer orientation-total pressure for floor from customers

*customer orientation

-total pressure for floor from floor*(1-customer orientation)

Units: pressure unit

"NYSE Fraction of E-Trade"= INTEG (
"change in fraction of e-trade",
0)

Units: Dmnl

Fraction of totally automated trading that the NYSE allows for its customers.

NYSE Market Share= INTEG (
(change in market share),
0.768)

Units: Dmnl

Every percentage point in market share equals about \$2.3 million of net income for NYSE Group, according to estimates by analysts at New York-based JPMorgan Chase & Co.
<http://www.rblt.com/documents/Bloombergnews9-8-06.pdf> (8. Nov. 07) Rosenberg Securities Here, Market Share does not derive from dividing the NYSE trading volume by total volume. This is because the modeling of the NYSE Market Share focuses on the customers' decision where to send orders. The trading volume is a by-product only that can be used to measure the model's fit to data. Look at WSJ Keeping Score: Stocks & Stock Markets" main header, under which is a chart headlined: "Trading Diary: Volume, Advancers, Decliners."

pcvd adequacy of market share=

NYSE Market Share/desired market share

Units: Dmnl

"REF. COMMITMENT TO S.O. PER INERTIA"=
1

Units: 1/consistency unit

"REF. FRACT. CONSISTENCY DECREASE"=
0.092

Units: Dmnl/Year

According to the US Department of Labor, Bureau of Labor Statistics, annual turnover rates (hire) for the finance and insurance industry in the US average at about 22 percent in the period up to the Grasso scandal (2001-2003). Turnover rates (hire) for government average at about 18 % (Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2008-09 Edition, Job Openings and Labor Turnover Survey (JOLTS), <http://data.bls.gov/PDQ/outside.jsp?survey=jt>, 16. Juli 2008). I make two assumptions: First, since the NYSE used to be a non-profit organization, I assume that the turnover

rate has greater similarity to that of government than with the rest of the financial industry. Second, due to the statement of a NYSE employee that people were grown from within, I assume that only half of them came from outside the organization. a turnover rate similar to that in government. Thus the assumed external turnover rate is $18.5\% / 4 = 9.2\%$

"REF. FRACT. INSTITUTIONALIZATION"=
0.15

Units: Dmnl/Year

Institutionalization grows by a fraction of 0.15 of current inertia per year. Since ref. institutionalization is higher than ref. consistency decrease, the organization becomes inert over the years.

"REF. TIME TO CHANGE CUSTOMER ORIENTATION"=
1

Units: Year

"REF. TIME TO CHANGE TRADING"=
2

Units: Year

"rel. pressure for e-trade test"=

"total pressure for e-trade from customers"-total pressure for the floor
Units: pressure unit

"rel. pressure for e-trade"=

"total pressure for e-trade from customers"*customer orientation/("total pressure for e-trade from customers"

*customer orientation+total pressure for floor from customers*customer orientation +total pressure for floor from floor*(1-customer orientation))

Units: Dmnl

Describes perception: Ratio of pressures for and against e-trade, multiplied with the weight of customer orientation.

TIME TO ADJUST DES MARKET SHARE=
3

Units: Year

"TIME TO CHANGE ACCUSTOMED E-TRADE"=
2

Units: Year

time to change customer orientation=

"REF. TIME TO CHANGE CUSTOMER ORIENTATION"*effect of commitment on time to change

Units: Year

time to change trading=

effect of commitment on time to change*"REF. TIME TO CHANGE TRADING"

Units: Year

"total pressure for e-trade from customers"=

"pressure for e-trade per inst. customer"*Number of Institutional Customers

Units: pressure unit

total pressure for floor from customers=

pressure for floor per customer*"no of non-institutional customers"

Units: pressure unit

total pressure for floor from floor=

("cultural pressure for sp. system per floor firm"+"resistance pressure for sp. system
per floor firm"

)*Power of Floor Firms

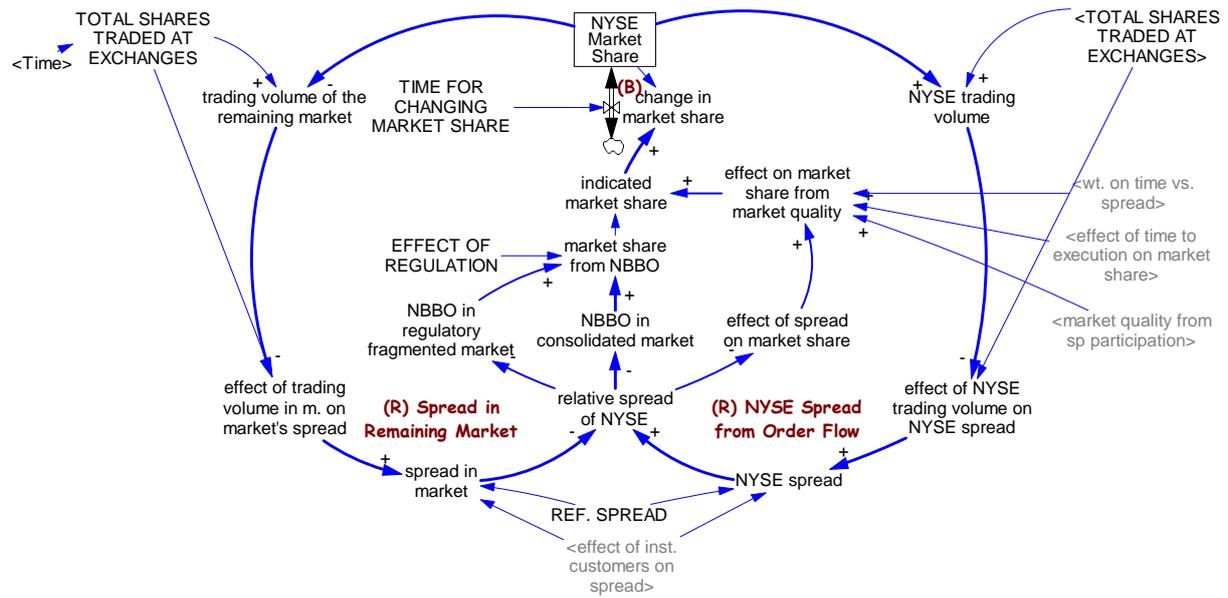
Units: pressure unit

total pressure for the floor=

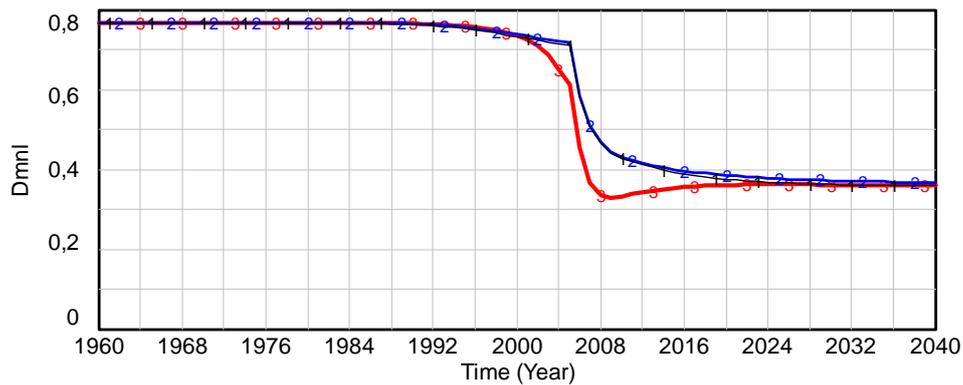
total pressure for floor from customers+total pressure for floor from floor

Units: pressure unit

9 Appendix VIII: Market Share



NYSE Market Share



NYSE Market Share : s adaptation ————
 NYSE Market Share : s ex. + end. pressures ————
 NYSE Market Share : s base run ————

change in market share=

$$\frac{(\text{indicated market share} - \text{NYSE Market Share})}{\text{TIME FOR CHANGING MARKET SHARE}}$$

MARKET SHARE

Units: Dmnl/Year

"effect of inst. customers on spread"= WITH LOOKUP (

Number of Institutional Customers,

((0,0)-(100,1]),(0,1),(10,0.872807),(20,0.77193),(30,0.640351),(40,0.552632),
 (50,0.45614),(60,0.368421),(70,0.267544),(80,0.219298),(90,0.153509),(100,0.1)))

Units: Dmnl

effect of NYSE trading volume on NYSE spread= WITH LOOKUP (

NYSE trading volume/TOTAL SHARES TRADED AT EXCHANGES,

((0,0.8)-(1,1.2]),(0,1.1),(0.5,1),(1,0.9)))

Units: Dmnl

EFFECT OF REGULATION=
STEP(1, 2005)

Units: Dmnl

Bennett and Wei state that around 2002 on average the NASDAQ had 22 market centers it receives orders from, the NYSE had 7 on average (Bennett and Wei 2006, pp. 54-55).

effect of spread on market share= WITH LOOKUP (relative spread of NYSE, ((0,0.9)-(2,1.1)],(0,1.1),(0.4,1.095),(0.75,1.07),(1,1),(1.25,0.93),(1.6,0.905),(2,0.9)))

Units: Dmnl

effect of time to execution on market share= WITH LOOKUP (relative time to execution, ((0,0)-(10,1.2)],(0,1.136),(0.5,1.03158),(1,1),(1.5,0.99),(2,0.98),(3,0.957895),(5,0.873684),(7,0.657895),(10,0.01)))

Units: Dmnl

((0,0)-(10,1.2)],(0,1.136),(0.4,1.1),(0.75,1.04),(1,1),(1.25,0.96),(1.6,0.9),(2,0.85),(5,0.65),(8,0.55),(10,0.5))\!\!\!

"effect of trading volume in m. on market's spread"= WITH LOOKUP (trading volume of the remaining market/TOTAL SHARES TRADED AT EXCHANGES, ((0,0.92)-(1,1.2)],(0,1.13),(0.5,1.03),(1,0.93)))

Units: Dmnl

This effect has great similarity with the 'effect of NYSE trading volume on NYSE spread' but it is slightly higher resulting in a little higher spread in order to account for the fact that several stock exchanges share the remaining market. Yet, the difference is only small since the NASDAQ dominates here.

effect on market share from market quality= ("wt. on time vs. spread"*effect of time to execution on market share+(1-"wt. on time vs. spread")*effect of spread on market share)*market quality from sp participation
Units: Dmnl

indicated market share=
market share from NBBO*effect on market share from market quality
Units: Dmnl

market quality from sp participation=
"effect of sp. participation on market quality"*"REF. MARKET QUALITY FROM SP. PARTICIPATION"
Units: Dmnl

Volatility 11.33 pre hybrid, and 12.12 since hybrid, units are 5 min/bps, Nyse Group (2007) NYSE completes Hyb. Mark. phase III activation. Reduced volatility was the key criterion of market quality. http://www.nyse.com/pdfs/hm_booklet.pdf (30. Sep. 07) NYSE Hybrid Market Training Program.

market share from NBBO=

NBBO in consolidated market*(1-EFFECT OF REGULATION)+NBBO in regulatory fragmented market

*EFFECT OF REGULATION

Units: Dmnl

NBBO in consolidated market= WITH LOOKUP (

relative spread of NYSE,

((0,0)-(1.5,1)],(0.5,0.7),(0.8,0.7),(0.9,0.665),(0.95,0.63),(1,0.5),(1.05,0.3),(1.1,0.15),(1.15,0.06),(1.2,0))

Units: Dmnl

This variable extinguishes the effect of trade execution time

because it forces volume to remain at the NYSE because they have the national best bid and offer.

NBBO in regulatory fragmented market= WITH LOOKUP (

relative spread of NYSE,

((0,0)-(1.5,1)],(0.5,0.6),(0.7,0.57),(0.9,0.5),(1,0.4),(1.05,0.3),(1.1,0.2),(1.15,0.12),(1.2,0.08))

Units: Dmnl

Both NBBO calculations follow a highly similar graphical shape,

except that for the fragmented market, it is on a lower level.

NYSE Market Share= INTEG ((change in market share),0.768)

Units: Dmnl

Every percentage point in market share equals about \$2.3 million

of net income for NYSE Group, according to estimates by analysts at New York-based JPMorgan Chase & Co.

<http://www.rblt.com/documents/Bloombergnews9-8-06.pdf> (8. Nov. 07)

Rosenberg Securities Here, Market Share does not derive from dividing the NYSE trading volume by total volume. This is because the modeling of the NYSE Market Share focuses on the customers' decision where to send orders. The trading volume is a by-product only that can be used to measure the model's fit to data. Look at WSJ Keeping Score: Stocks & Stock Markets" main header, under which is a chart headlined: "Trading Diary: Volume, Advancers, Decliners."

NYSE spread=

"REF. SPREAD"*effect of NYSE trading volume on NYSE spread*"effect of inst. customers on spread"

Units: \$/share

THE SPREAD IS THE DIFFERENCE BETWEEN BID AND ASK PRICE. quoted

spread pre hybrid 20.95, since hybrid 18.32, effective spread pre hybrid 7.50, since hybrid 8.17 bps, Nyse Group (2007) NYSE completes Hyb. Mark. phase III activation Now the effective spread is about 2 ct, which is 5 bpt * 40 USD avg. share price.

NYSE trading volume=

NYSE Market Share*TOTAL SHARES TRADED AT EXCHANGES

Units: share/Year

"REF. SPREAD"=
0.2

Units: \$/share

The spread is \$0.2 according to Jain (2005), S. 2969. According to the NYSE execution quality in 2003-04 the spread is around \$0.05 per share. For the year 1991 Huang and Stoll (1996, p. 323) find a quoted half spread of 12.9 cents at the NYSE and of 24.6 cents at NASDAQ. Effective half spreads are 7.9 and 18.7 cents. Bennett and Wei (2006, pp. 51 and 62) state that the difference between their sample of NASDAQ and NYSE stocks is 3 cents in quoted (10 bp) and in effective (16 bp) spreads. They test from January 2002 to March 2003. They also find a daily quoted spread of 9.2 cents at the NASDAQ and of 5.7 cents at the NYSE (pp. 60 and 62). Effective spreads in the sample are 8.5 cents on NASDAQ and 5.6 cents at the NYSE. Realized spreads are 4.5 on NASDAQ and -0.4 at the NYSE (p. 62).

relative spread of NYSE=

NYSE spread/spread in market

Units: Dmnl

spread in market=

"REF. SPREAD"*"effect of trading volume in m. on market's spread"*"effect of inst. customers on spread"

Units: \$/share

TIME FOR CHANGING MARKET SHARE=

1

Units: Year

TOTAL SHARES TRADED AT EXCHANGES= WITH LOOKUP (

Time,

([(1950,0)-(2050,4e+012)],(1960,1e+009),(1970,3.5e+009),(1980,1.4e+010),(1990,4.8e+010),(1995,1e+011),(2000,2.8e+011),(2005,4.5e+011),(2007,5.5e+011),(2010,9e+011),(2015,1.8e+012),(2020,2.33333e+012),(2030,3.15789e+012),(2040,3.64912e+012),(2050,3.89474e+012))

Units: share/Year

1 billion (1 Milliarde), 3.75e+009+RAMP(1.8e+010 ,1970, 2007).

Data is referred from NYSE trading volume, Annual reported volume, turnover rate, reported trades (mils. of shares), NYSE facts and figures. Data after 2007 is assumed.\!\\!

trading volume of the remaining market=

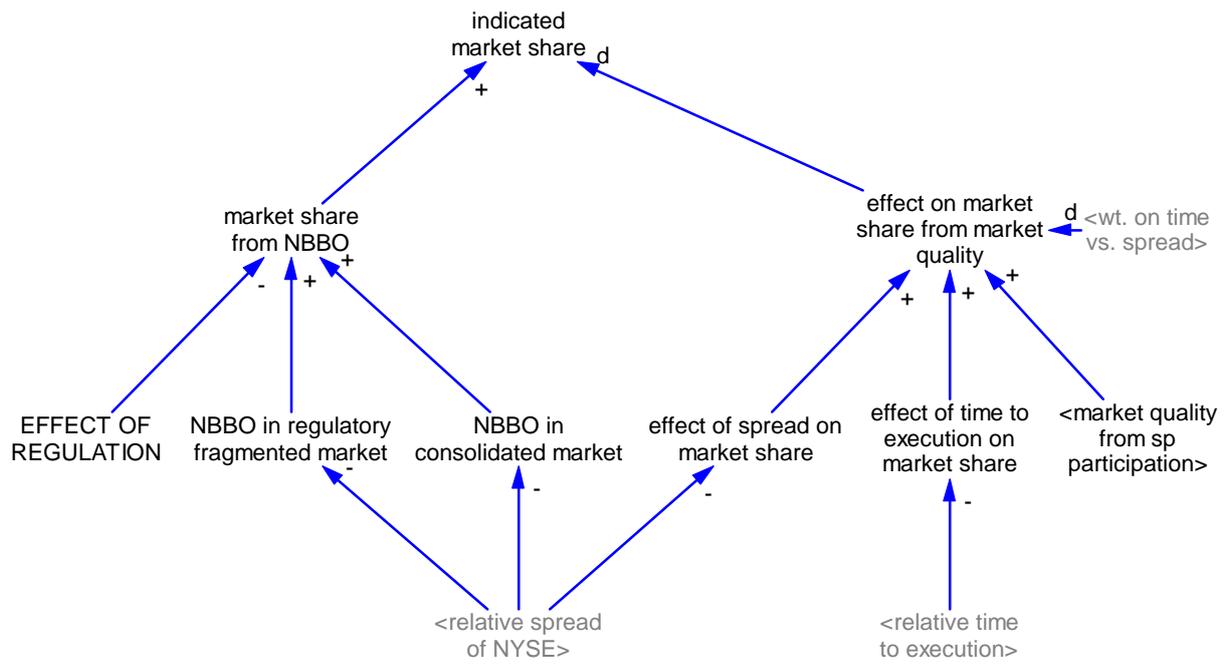
(1-NYSE Market Share)*TOTAL SHARES TRADED AT EXCHANGES

Units: share/Year

"wt. on time vs. spread"=

"effect of institutional customers on alg. trading"*"effect of technology on alg. trading"

Units: Dmnl



1 Appendix IX: Institutional Customers, Program Trading, and Institutional Owners
Institutional customers and program trading

<u>Sensitivity Analysis</u>	<u>Name of Variables Changed</u>	<u>Base Run Parameter Value</u>	<u>Range of Parameter Values in Sensitivity Analysis</u>
Resistance	REF. RESISTANCE	0.3	0 - 1
Floor Power	POWER OF FLOOR FIRMS	100	50 - 150
Floor	REF. RESISTANCE	0.3	0 - 1
	REF. CULTURAL PRESSURE PER FLOOR FIRM	1	0 - 2
	DEGREE OF COHESIVENESS OF FLOOR FIRMS	0.7	0 - 1
	POWER OF FLOOR FIRMS	100	50 - 150
Time Trading	REF. TIME TO CHANGE TRADING	2	0.5 - 10
Time Customer Orientation	REF. TIME TO CHANGE CUSTOMER ORIENTATION	1	0.5 - 10
All	REF. RESISTANCE	0.3	0 - 1
	REF. CULTURAL PRESSURE PER FLOOR FIRM	1	0 - 2
	DEGREE OF COHESIVENESS OF FLOOR FIRMS	0.7	0 - 1
	REF. PRESSURE PER DISSATISFACTION UNIT	1	0.1 - 2
	REF. TIME TO CHANGE TRADING	2	0.5 - 5

	REF. TIME TO CHANGE CUSTOMER ORIENTATION	1	0.5 - 5
	POWER OF FLOOR FIRMS	100	50 - 150
Dissatisfaction Pressure	REF. PRESSURE PER DISSATISFACTION UNIT	1	0 - 10

Additionally a sensitivity analysis for the pressure that develops out of the dissatisfaction of institutional customers was run. It is comparable to the extreme conditions test where the model was run when no e-trade develops in the market. Also the customer reaction varies so that extremely strong institutional customers can force an earlier and more gradual implementation of electronic trading. When institutional customers do not develop strong pressures, then in rare cases e-trade does not get implemented to the full extent.

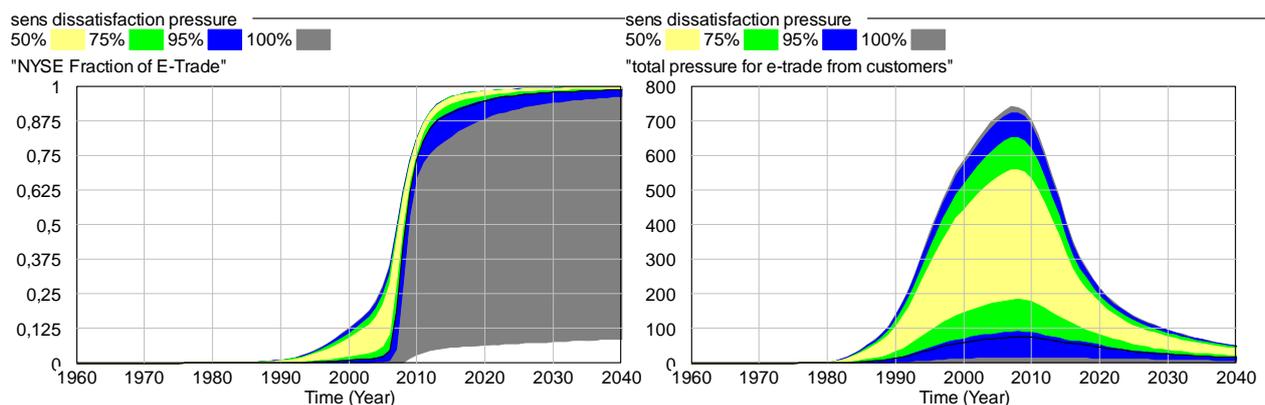


Figure 23: Sensitivity for pressure for e-trade