Partial Contracts

John Moore
Edinburgh and LSE

joint with

Oliver Hart
Harvard

O. Hart and J. Moore:

“Agreeing Now to Agree Later:
Contracts that Rule Out but do not Rule In”,
mimeo, September 2005

“Contracts as Reference Points”,
mimeo, July 2006

O. Hart and J. Moore:

“Agreeing Now to Agree Later:
Contracts that Rule Out but do not Rule In”,
mimeo, September 2005 (PAPER 1)

“Contracts as Reference Points”,
mimeo, July 2006 (PAPER 2)

Partial Contracts

or

More is Less?

or

Moore is Less?

Other themes to watch for:

- flexibility vs. rigidity
- money is taken “off the table” first:
  - start by agreeing the price
  - later agree other elements of contract

  e.g. employment contract
- nature of employment contract:

  do bosses have power?
- efficiency wages/Keynes

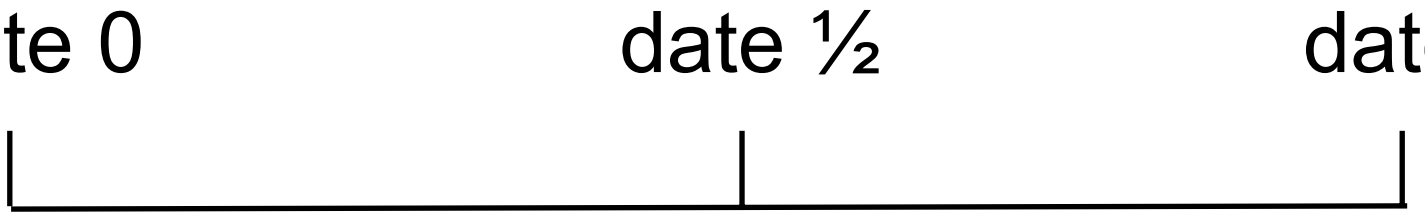
Buyer/Seller model:

Bishop (B)

Soprano (S)

risk neutral

no wealth constraints



competitive market

lock-in

bilateral monopoly

B and S meet and contract

uncertainty resolved

B and S trade

2 states, distinguished by colour:

Lilac State prob ½

Red State prob ½

B and S contract over:

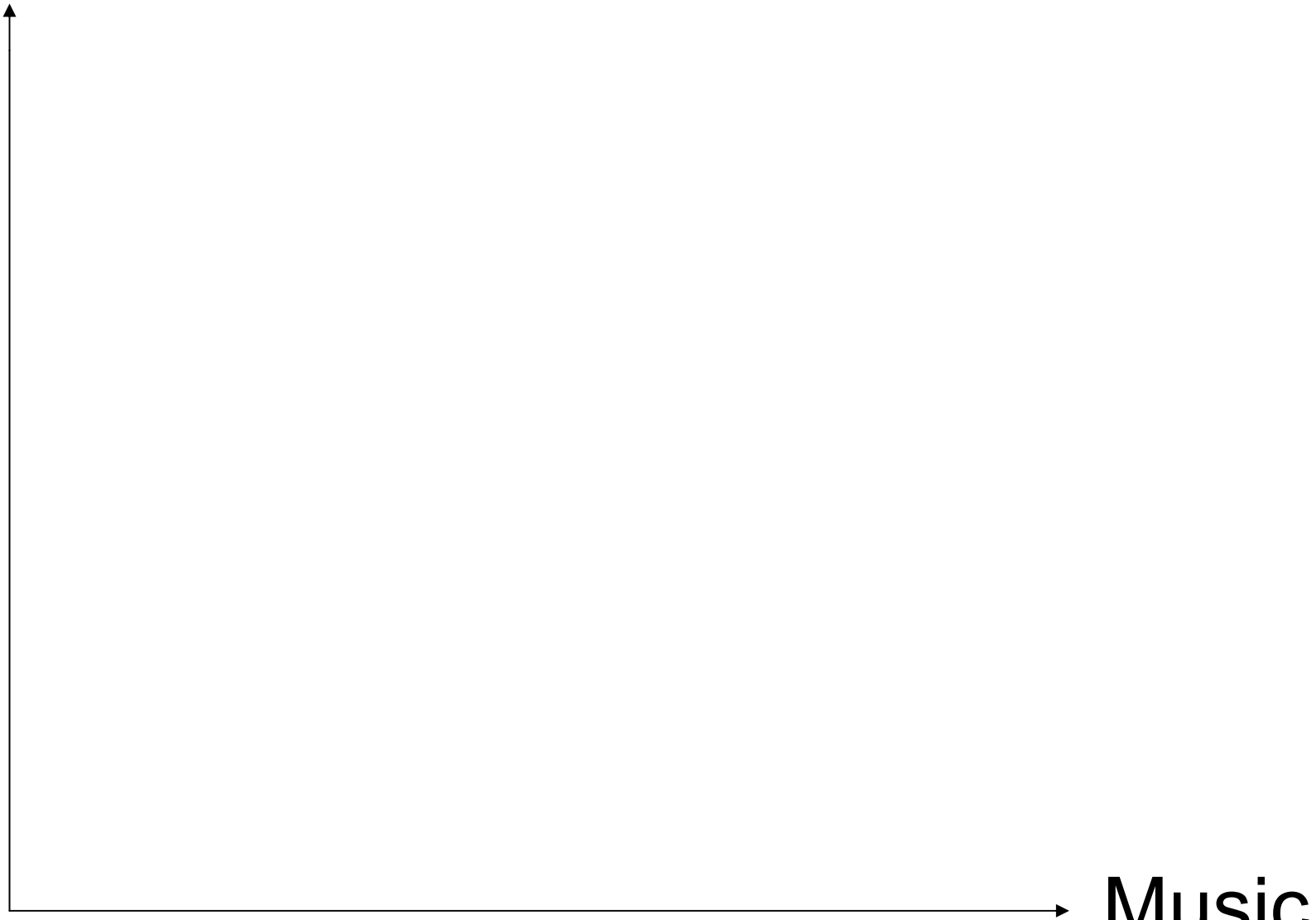
musical programme and price

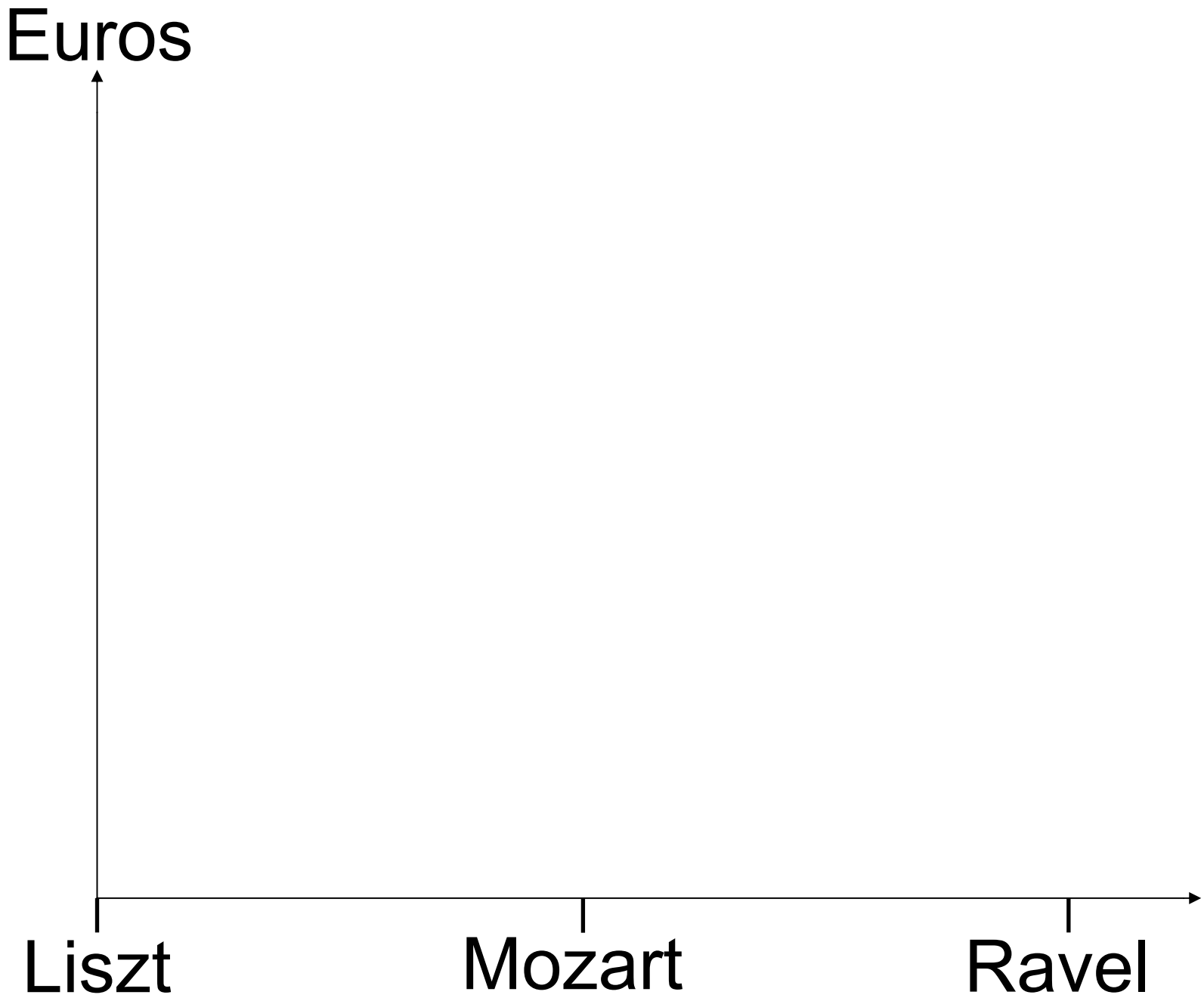
2 states, distinguished by colour:

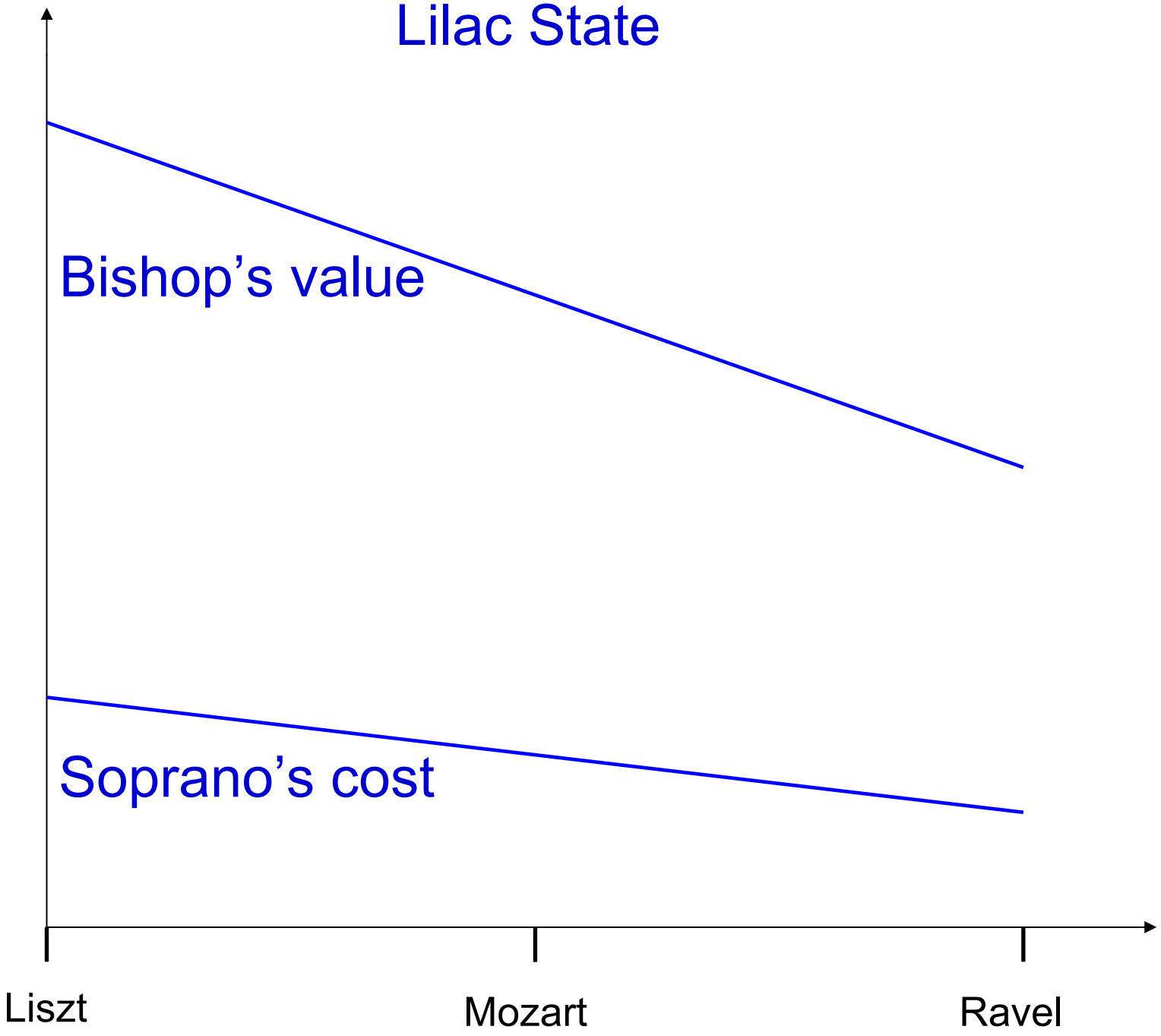
Lilac State	prob ½
Red State	prob ½

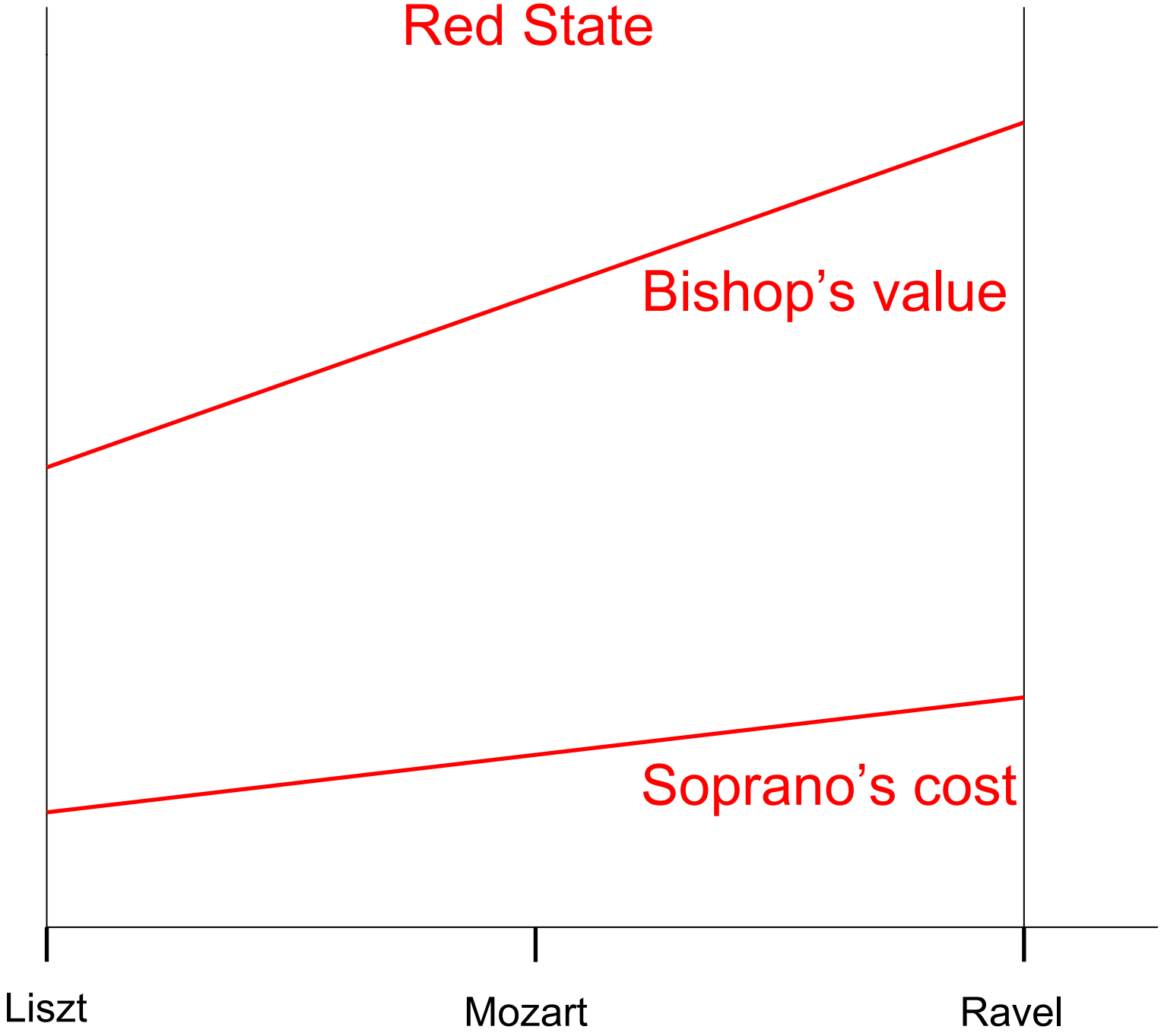
B and S contract over:

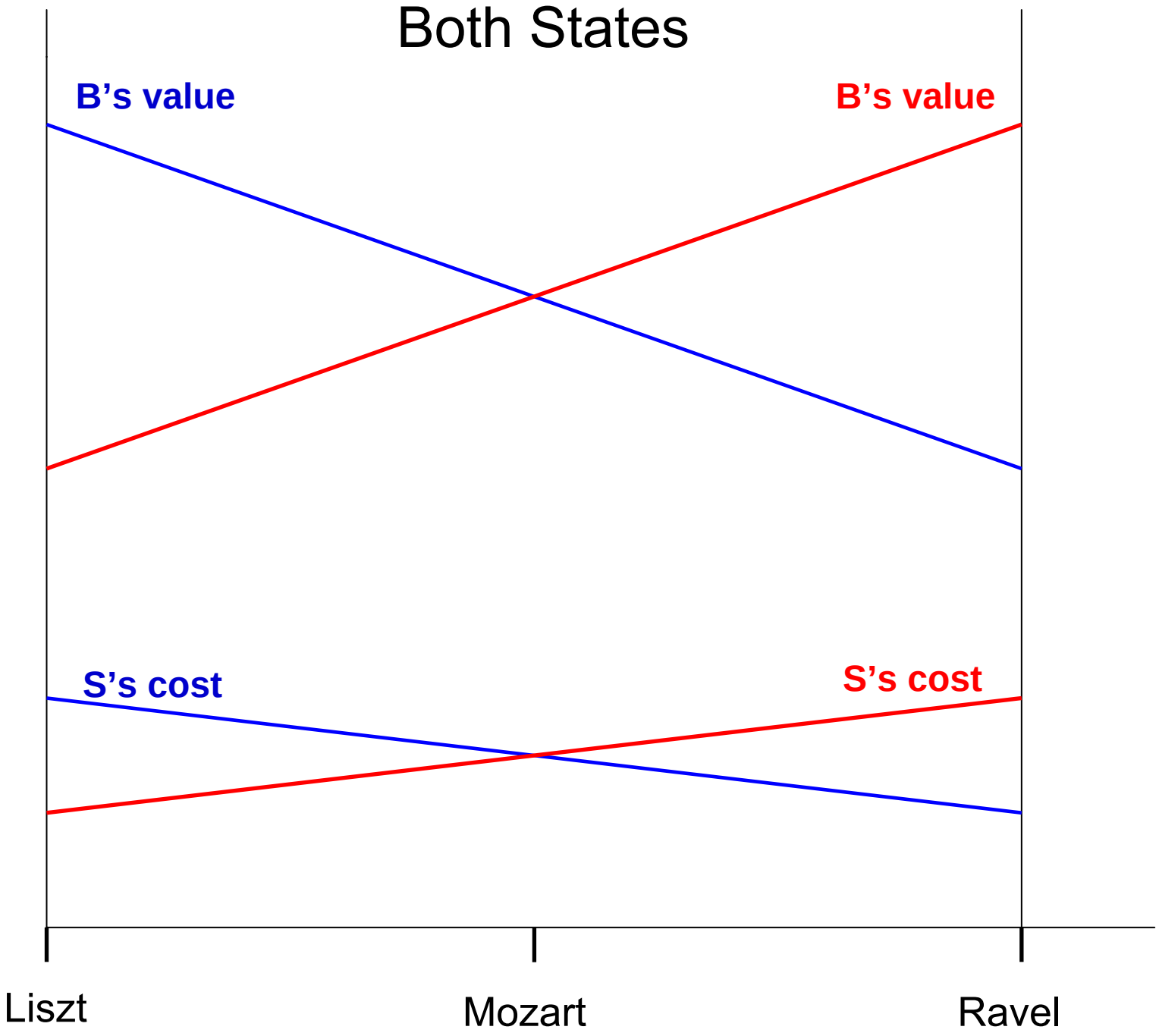
music/price	●
music/price	●

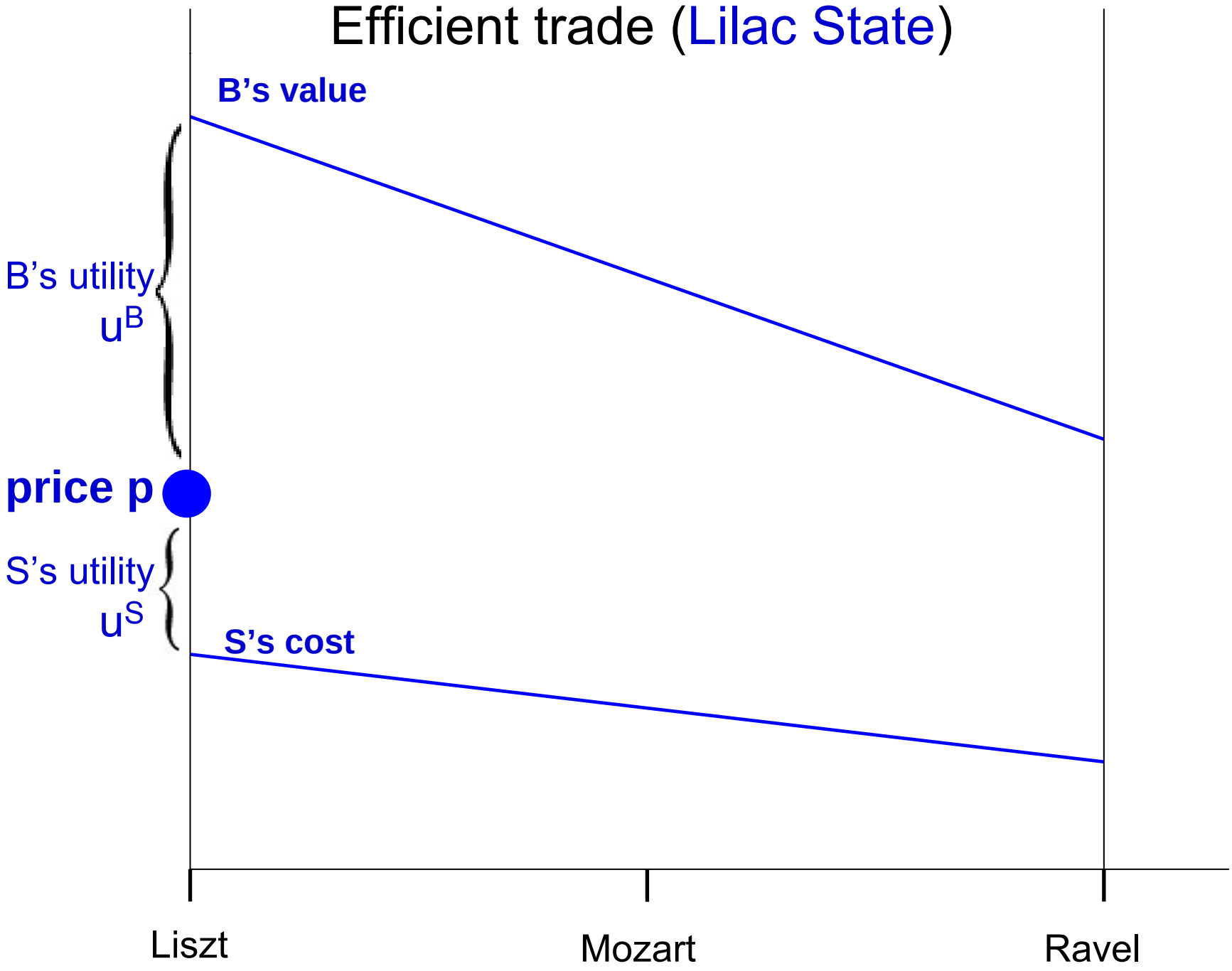

Music

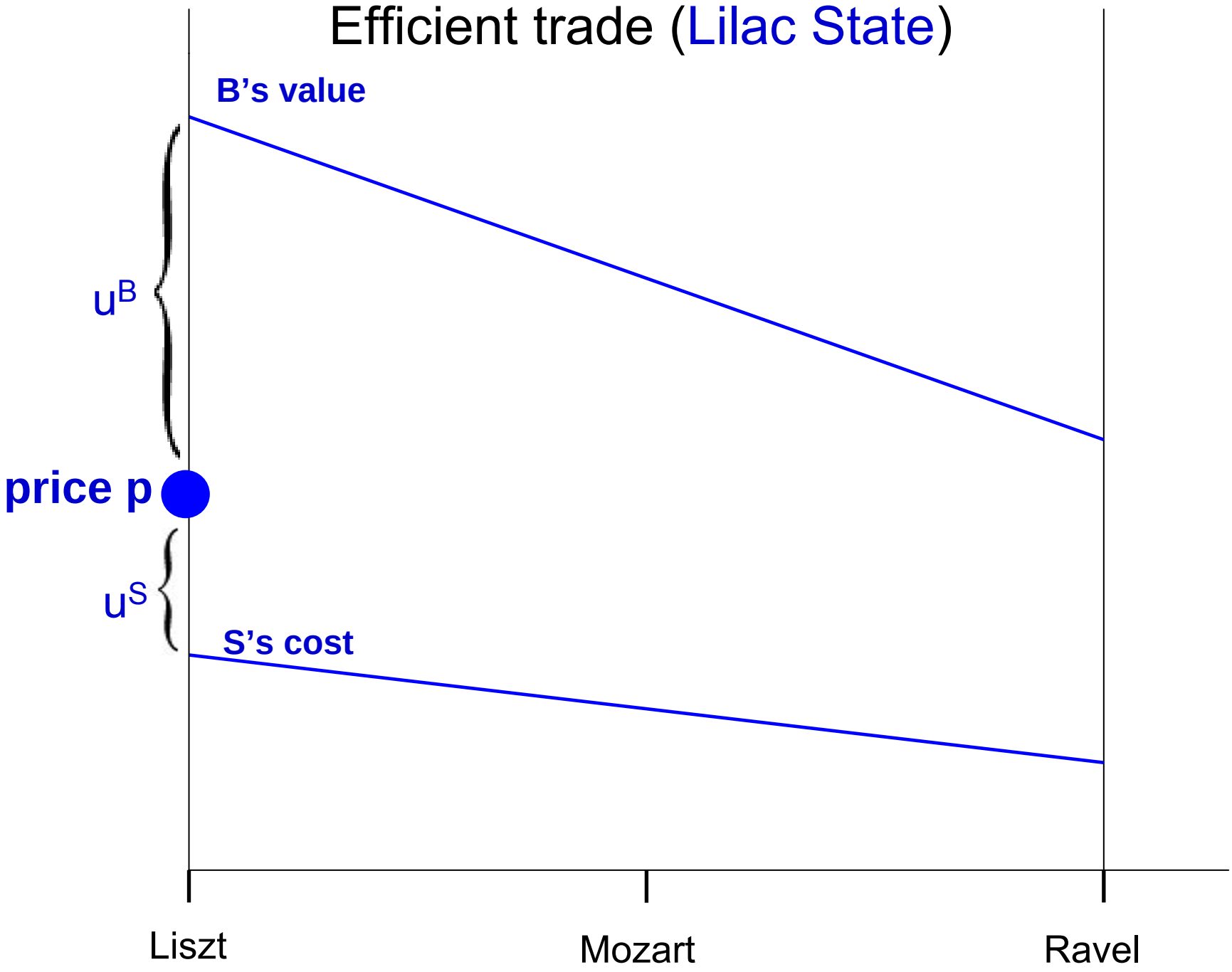

Euros
Liszt
Mozart
Ravel

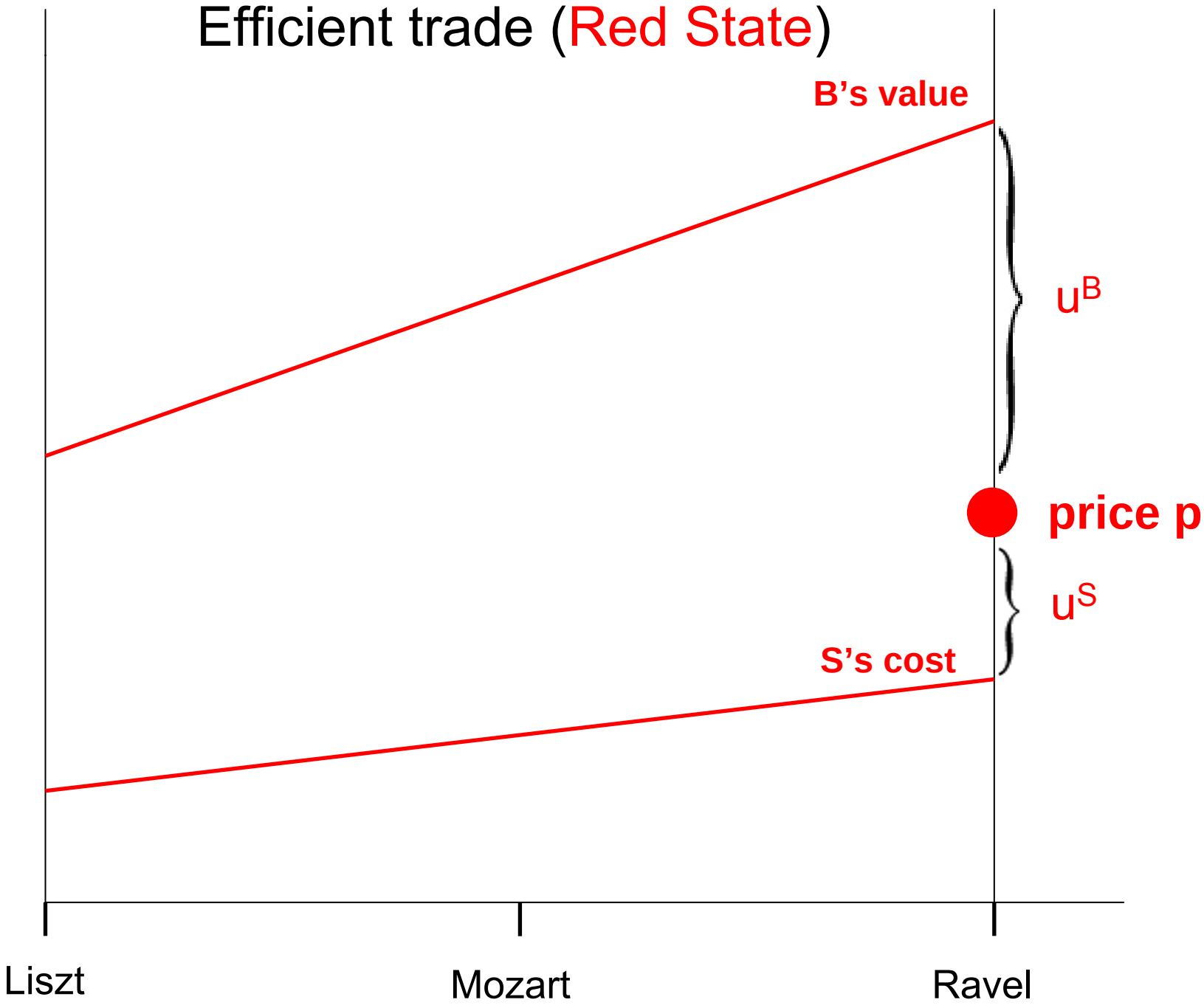

Lilac State
Bishop's value
Soprano's cost
Liszt
Mozart
Ravel


Red State
Bishop's value
Soprano's cost
Liszt
Mozart
Ravel

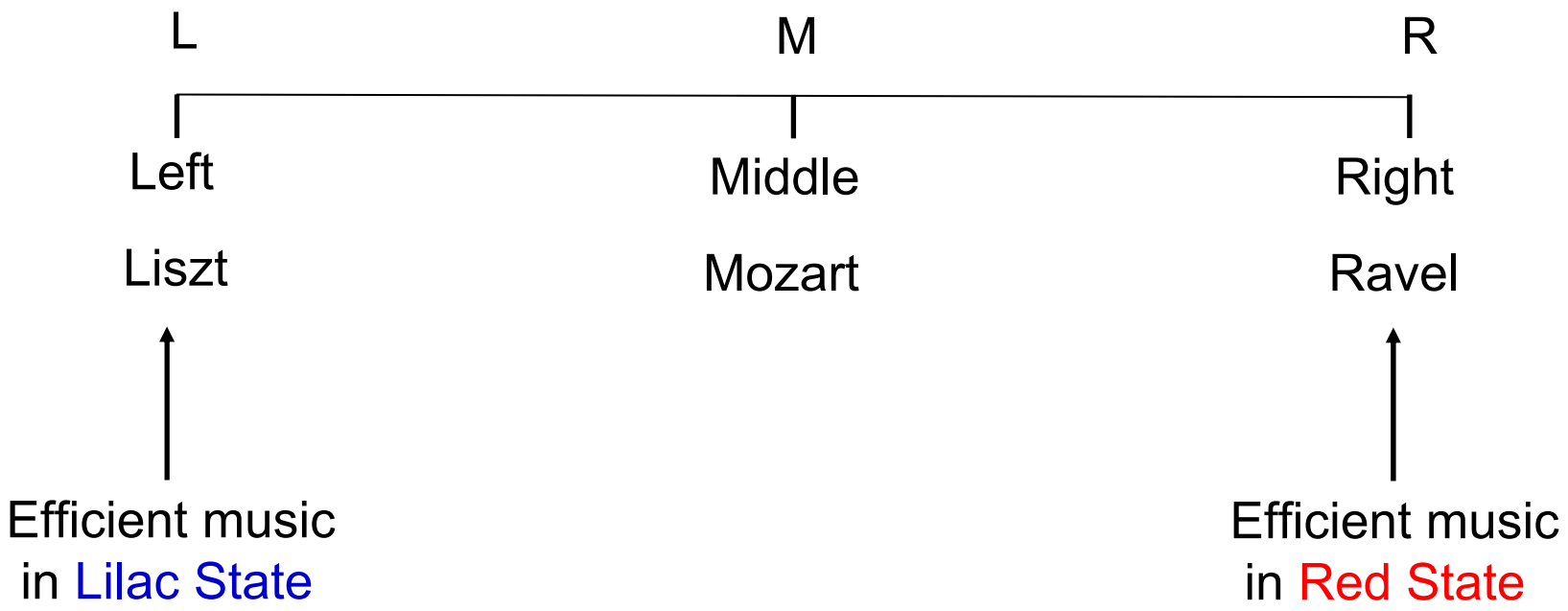

Both States
B's value
B's value
S's cost
S's cost
Liszt
Mozart
Ravel

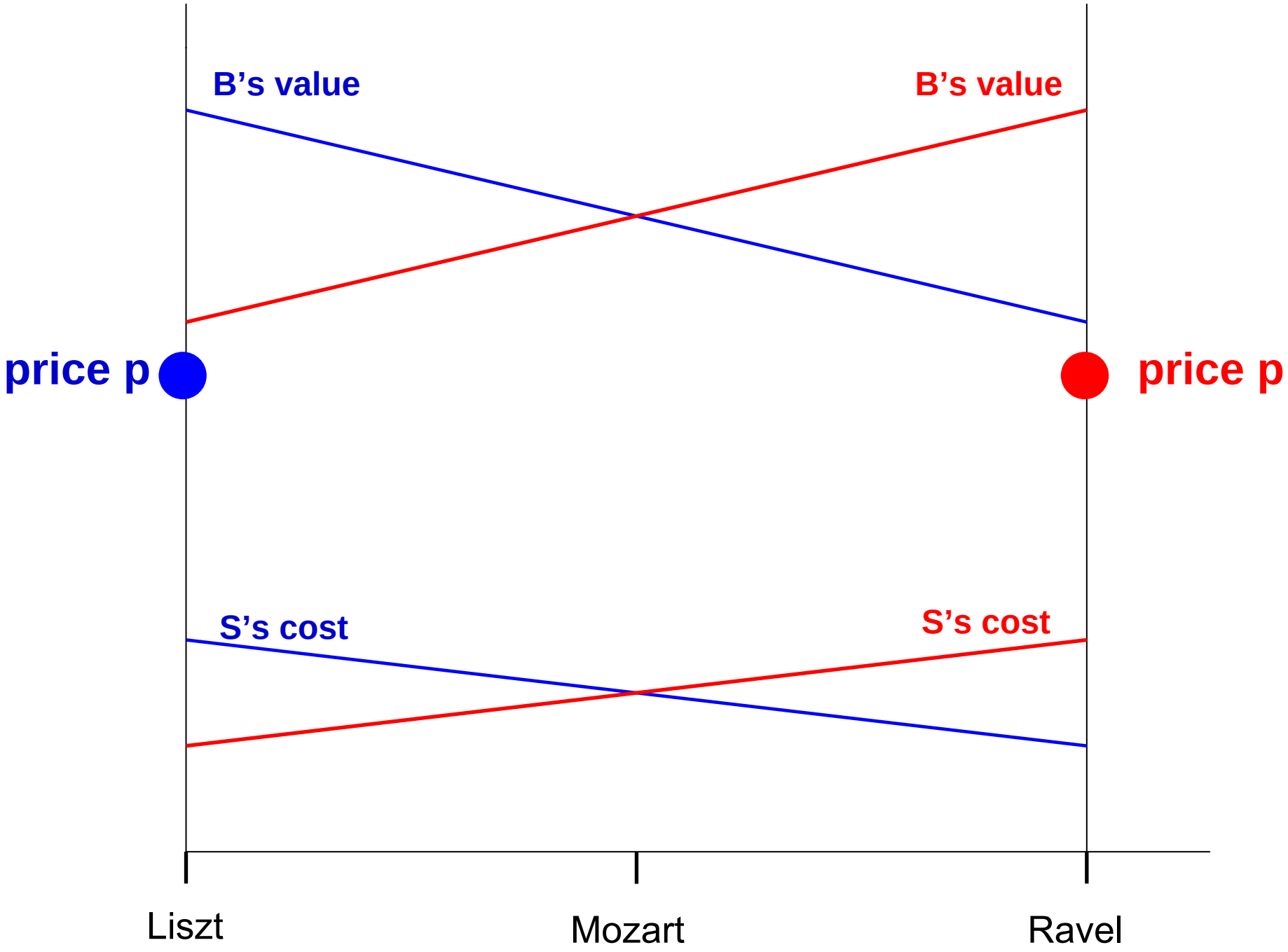

Efficient trade (Lilac State)
B's value
B's utility
u^B
price p
S's utility
u^S
S's cost
Liszt
Mozart
Ravel

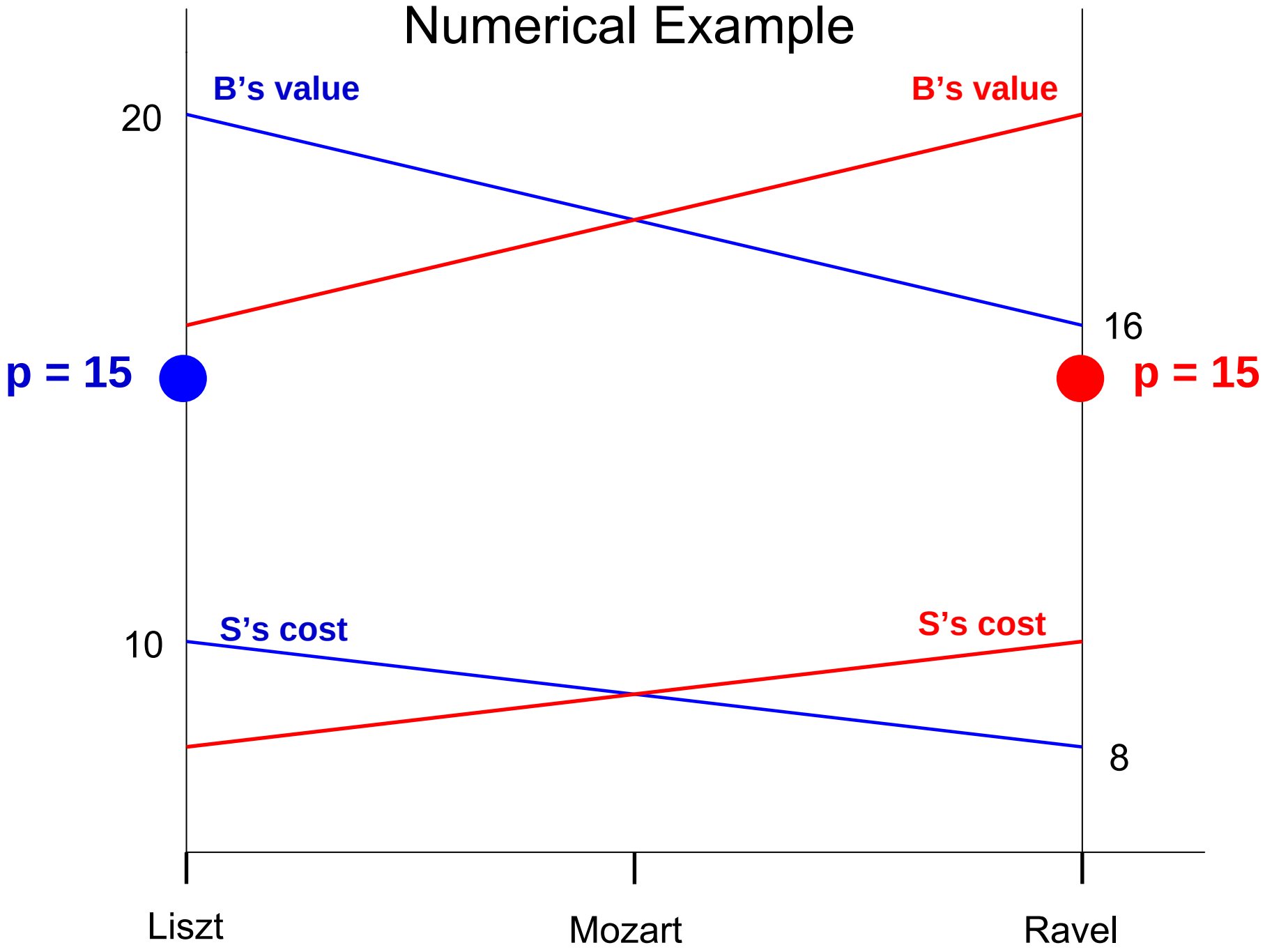

Efficient trade (Lilac State)
B's value
u^B
price p
u^S
S's cost
Liszt
Mozart
Ravel


Efficient trade (Red State)
B's value
u^B
price p
u^S
S's cost
Liszt
Mozart
Ravel

Mnemonic:


L
M
R
Left
Middle
Right
Liszt
Mozart
Ravel
Efficient music
in Lilac State
Efficient music
in Red State


B's value
B's value
price p
price p
S's cost
S's cost
Liszt
Mozart
Ravel


Numerical Example
B's value
B's value
20
16
p = 15
p = 15
10
S's cost
S's cost
8
Liszt
Mozart
Ravel

Problem: Judges are colour blind

=> states are non-verifiable at date 1

=> contracts cannot be state-contingent

B and S are not colour blind

=> they observe state at date 1

(no asymmetric information)

Question: What can be implemented?

Maskin mechanisms:

each party announces state

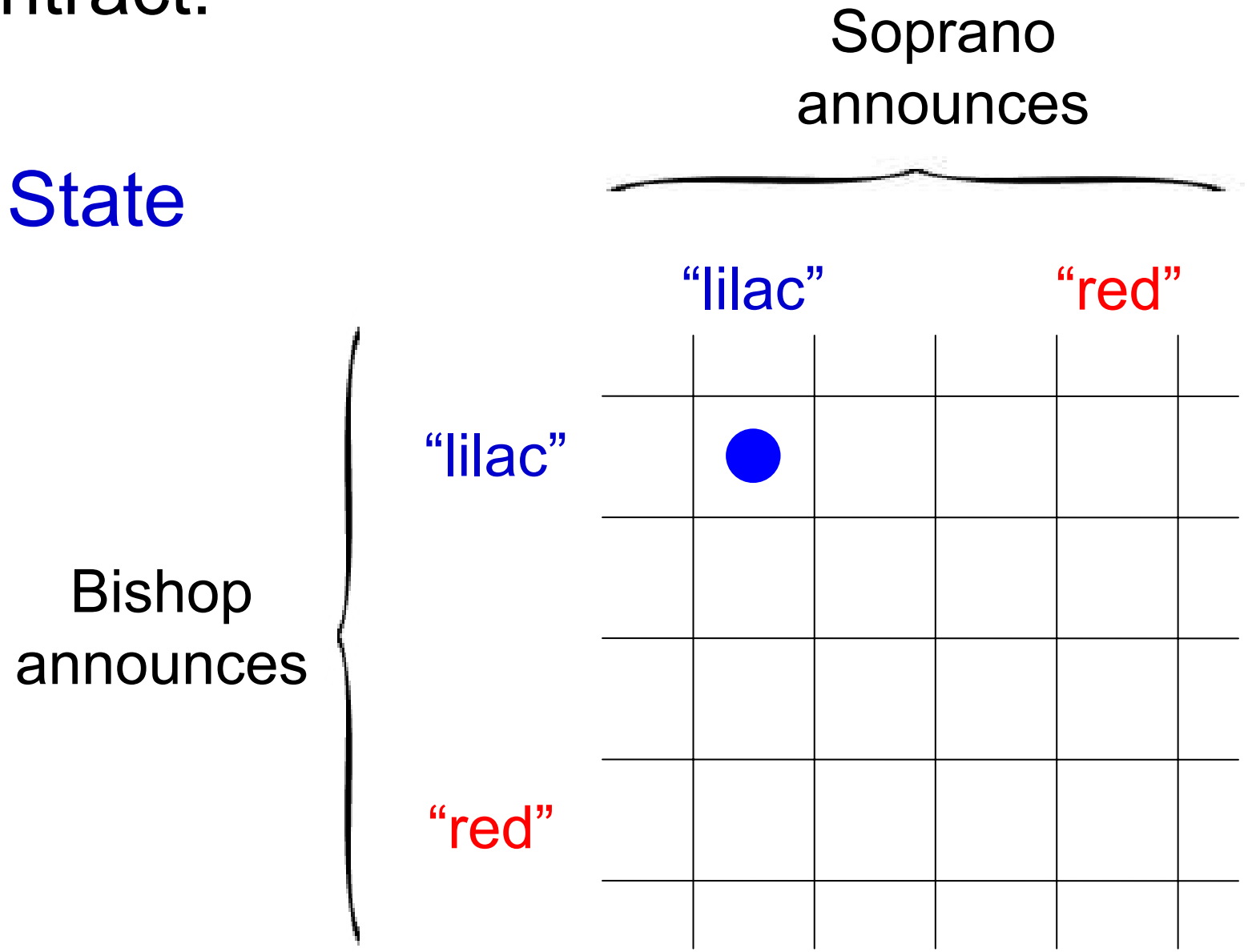
agree => implement desired music/price

disagree => implement something cunning

mechanism designed so that in equilibrium both parties want to announce true state

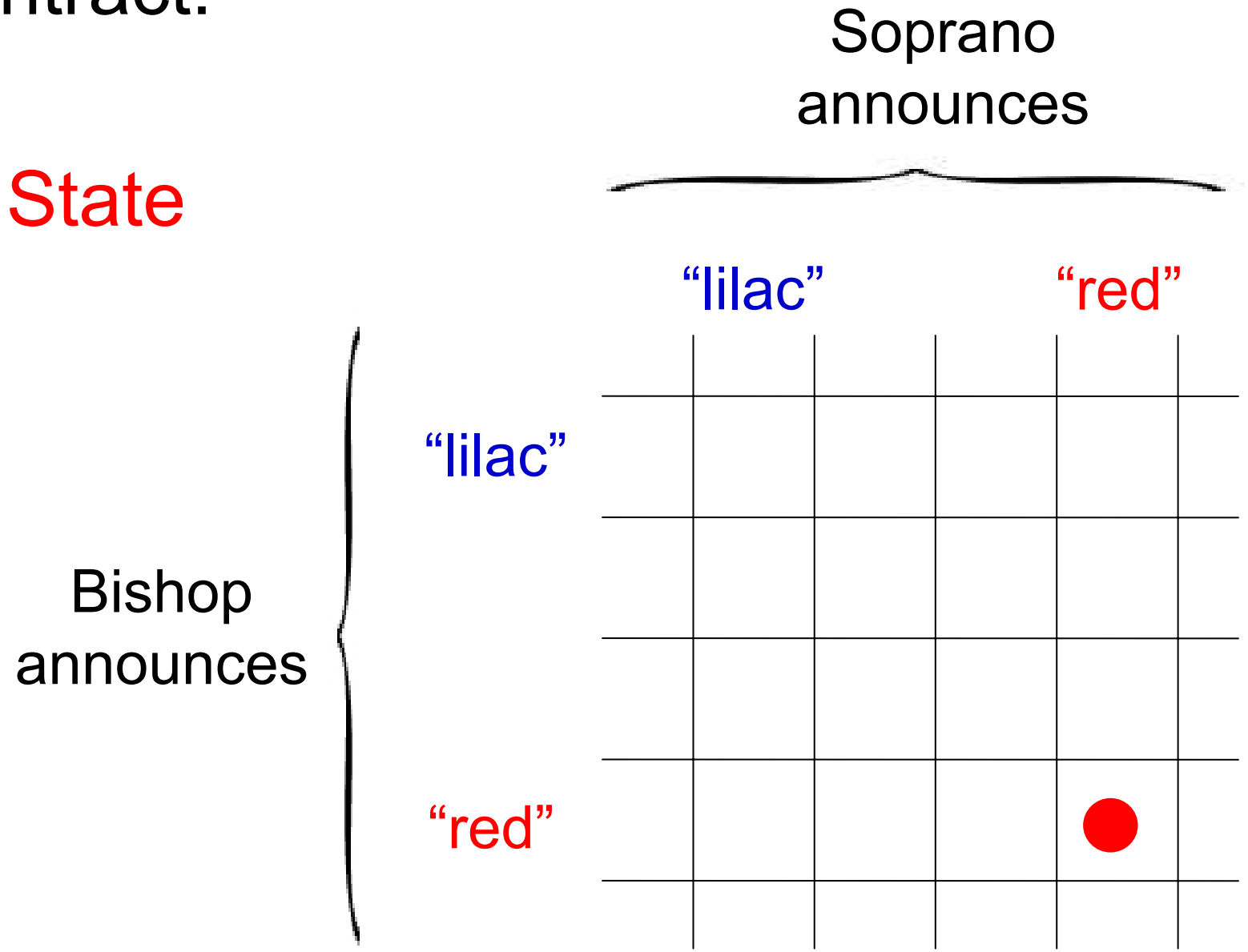
mechanism written into contract:

Lilac State

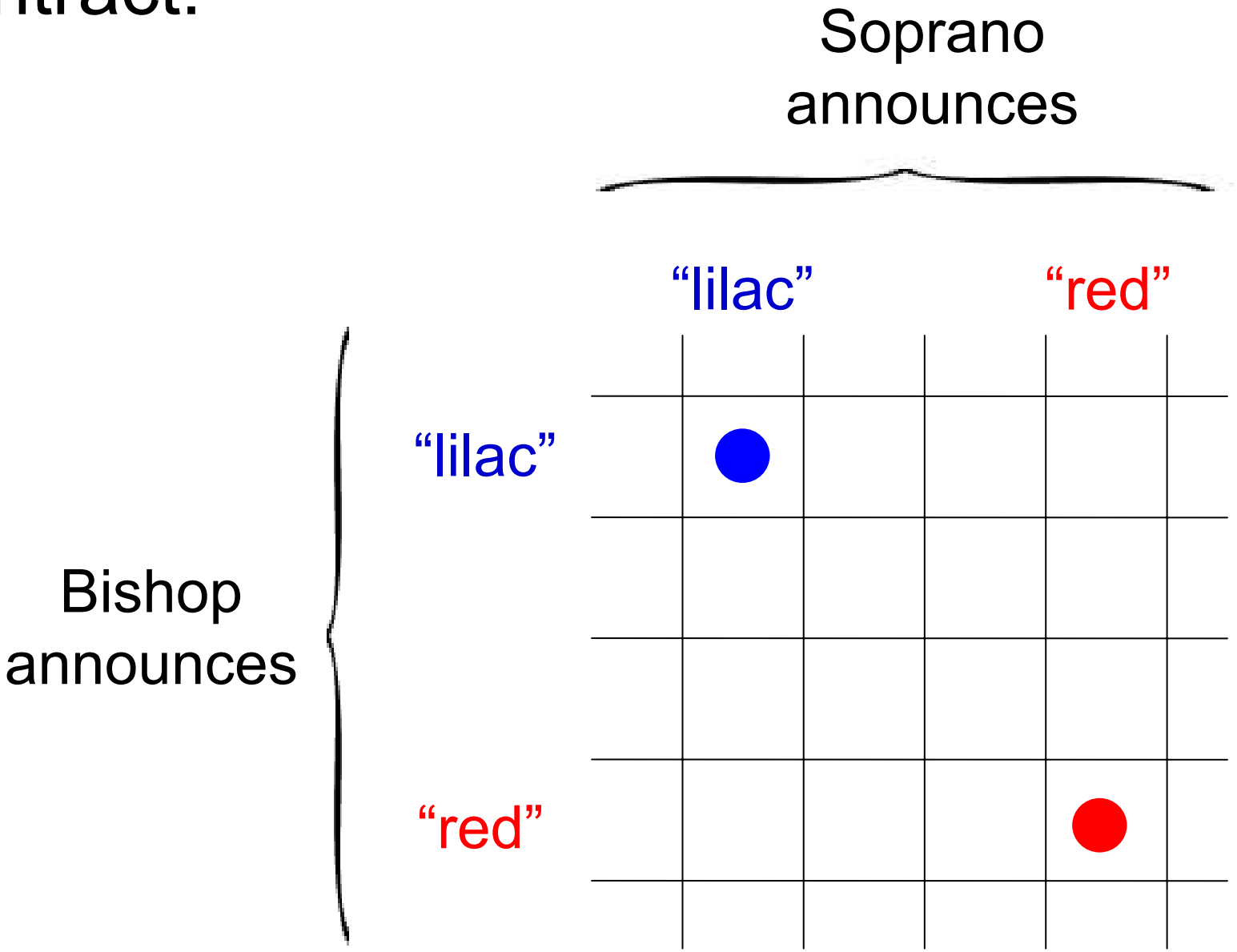


mechanism written into contract:

Red State

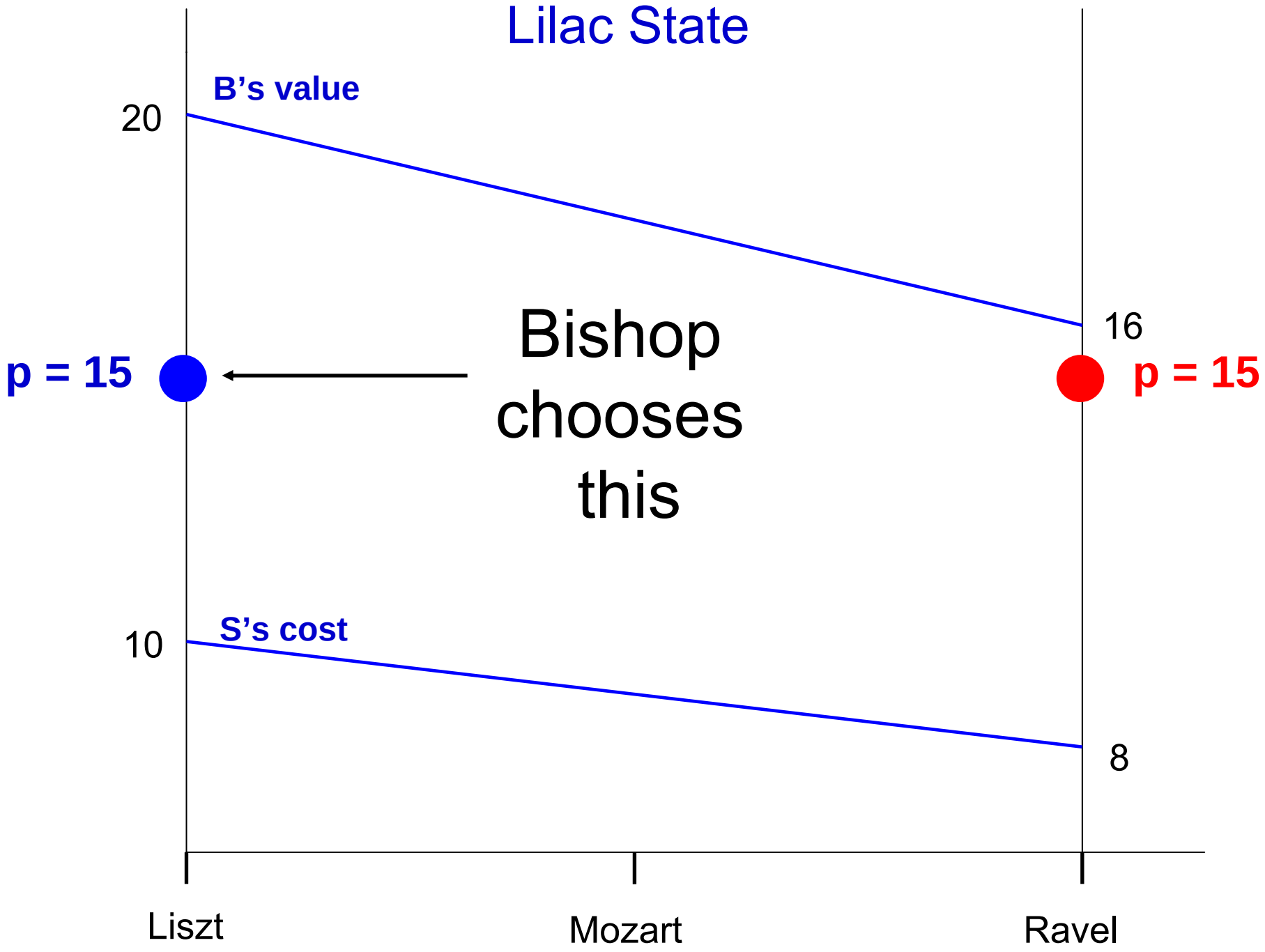


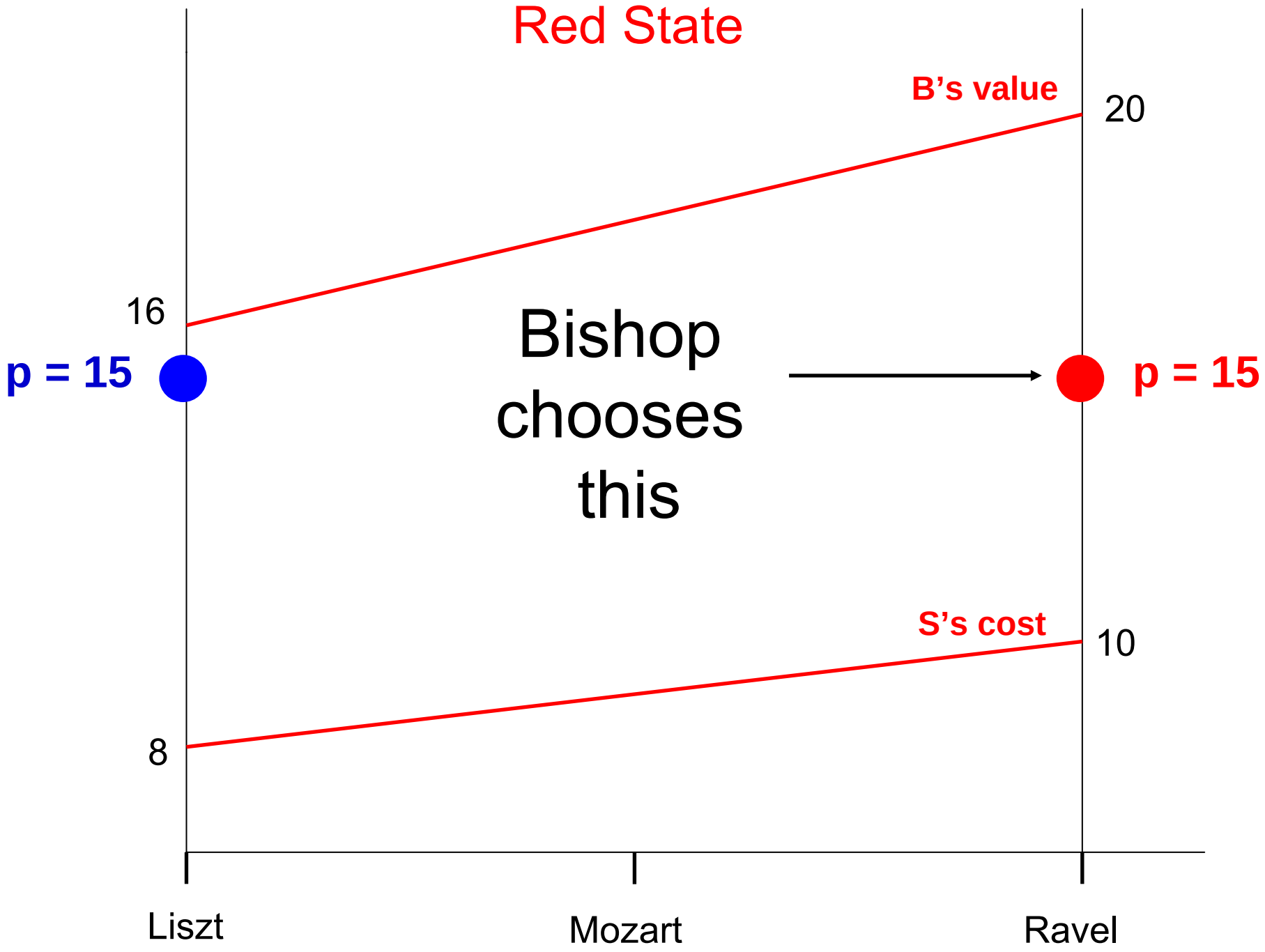
mechanism written into contract:



In our Bishop/Soprano model, there is a very simple Maskin mechanism:

fixed price ($p = p$)
Bishop chooses music


Lilac State
B's value
20
16
p = 15
p = 15
Bishop
chooses
this
S's cost
10
8
Liszt
Mozart
Ravel


Red State
B's value
20
16
p = 15
Bishop chooses this
p = 15
S's cost
10
8
Liszt
Mozart
Ravel

In our Bishop/Soprano model, there is a very simple Maskin mechanism:

fixed price ($p = p$)
Bishop chooses music

Maskin mechanisms are often sophisticated

Are we missing something?

When writing a contract,

could more sophistication
yield less welfare?

More is less?

Partial Contracting

Some aspects of performance are non-contractible,
beyond the reach of the law

Consummate vs. Perfunctory performance

Bishop may have legal right to choose music, but Soprano will be aggrieved if she feels she is being treated “unfairly

Bishop may have legal right to choose music, but Soprano will be aggrieved if she feels she is being treated “unfairly”, and retaliate by singing badly

Bishop may have legal right to choose music, but Soprano will be aggrieved if she feels she is being treated “unfairly”, and retaliate by singing badly (assume she is indifferent between singing well and badly)

Judge can determine whether Liszt, Mozart, or Ravel was actually sung,

but Judge cannot adjudicate how well the music was sung

What is “unfair” treatment?

Let us assume that the Soprano feels entitled to the music/price pair that maximises the Nash product

$$u^B \times u^S$$

Unless the Soprano gets this utility u^S, she will retaliate by singing badly

Crucial assumption (PAPER 1):

B and S have a common view of what is fair

Bishop also feels entitled to the music/price pair that maximises the Nash product

$$u^B \times u^S$$

Unless B gets this utility u^B, he will retaliate – by poisoning the peanuts

Crucial assumption (PAPER 1):

B and S have a common view of what is fair

Bishop also feels entitled to the music/price pair that maximises the Nash product

$$u^B \times u^S$$

Unless B gets this utility u^B, he will retaliate – by poisoning the peanuts, or by putting her up in the Youth Hostel not the Ritz

All this scope for retaliation

=> mechanisms don't have any bite

e.g. even if B has the right to choose music,
it is a right in name only

Fortunately, B and S agree on what is fair

(not true in PAPER 2!)

All this scope for retaliation

=> mechanisms don't have any bite

e.g. even if B has the right to choose music,
it is a right in name only

Fortunately, B and S agree on what is fair

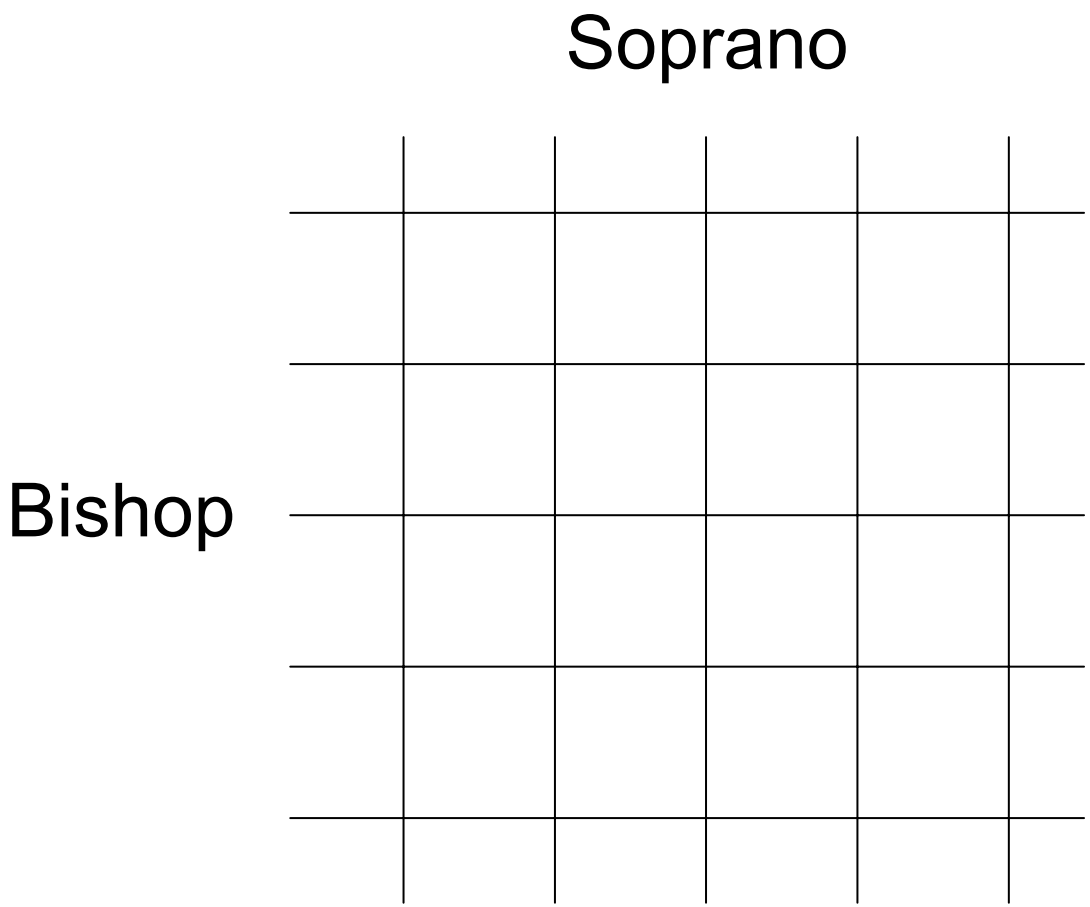
=> their choice of outcome is "Coasian"

Regardless of any formal mechanism that might have been stipulated in the contract, at date 1 the parties are in effect (Nash) bargaining over some

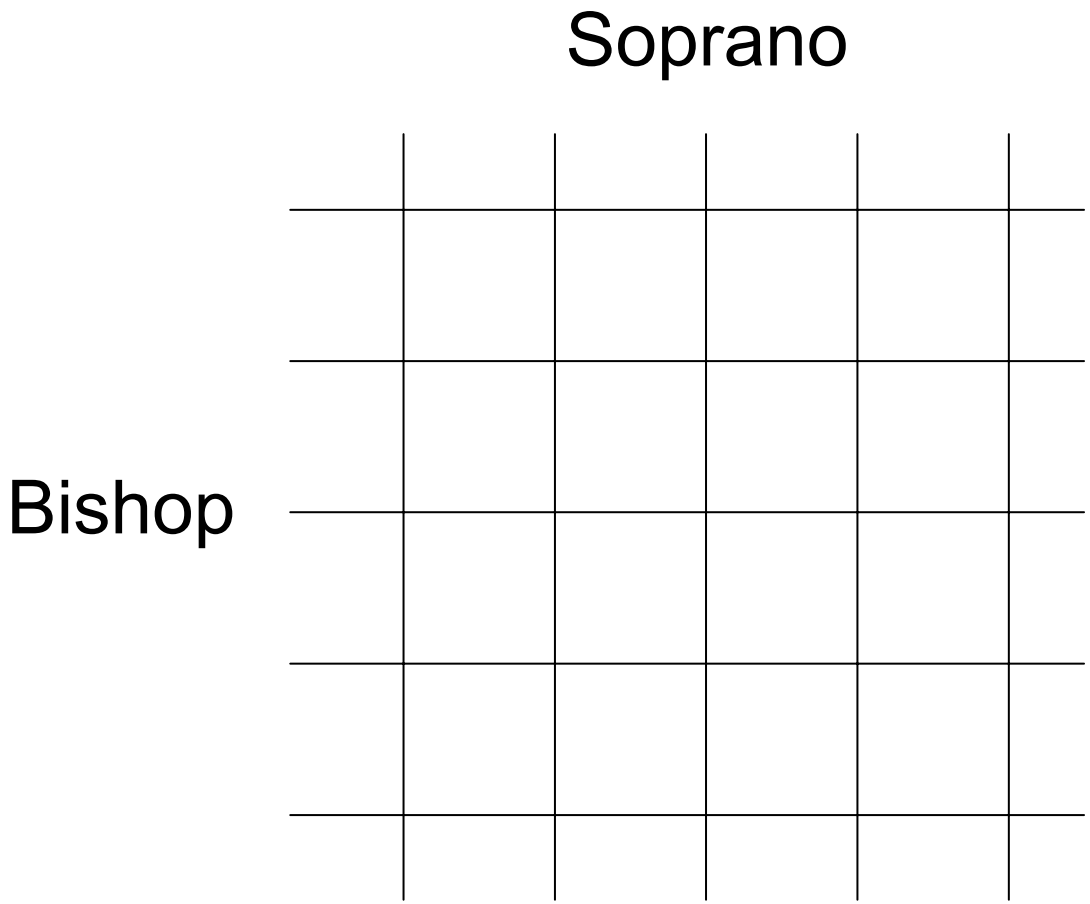
set C

of music/price pairs

Contract design at date 0 amounts to no more than the specification of C

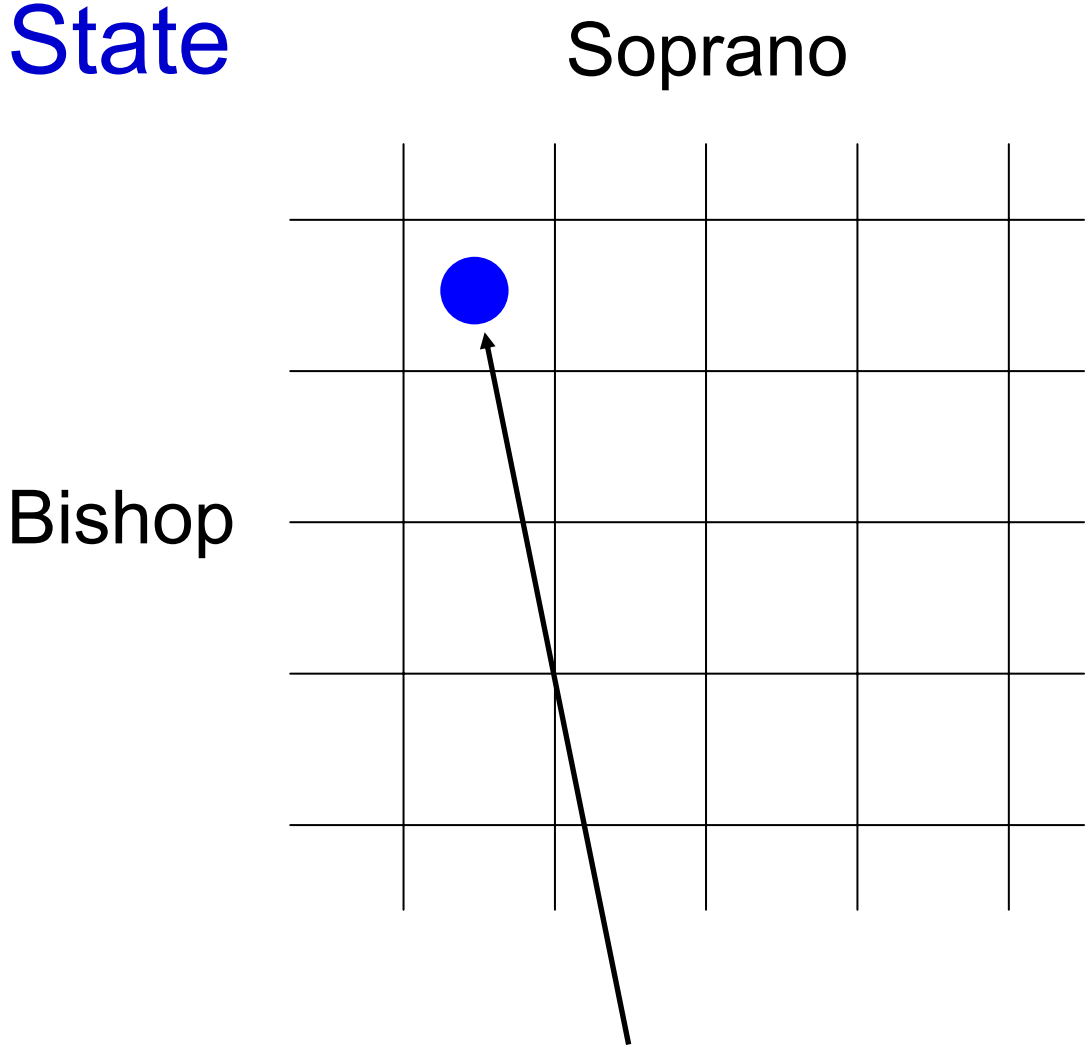


B and S bargain over the set C of outcomes in this matrix



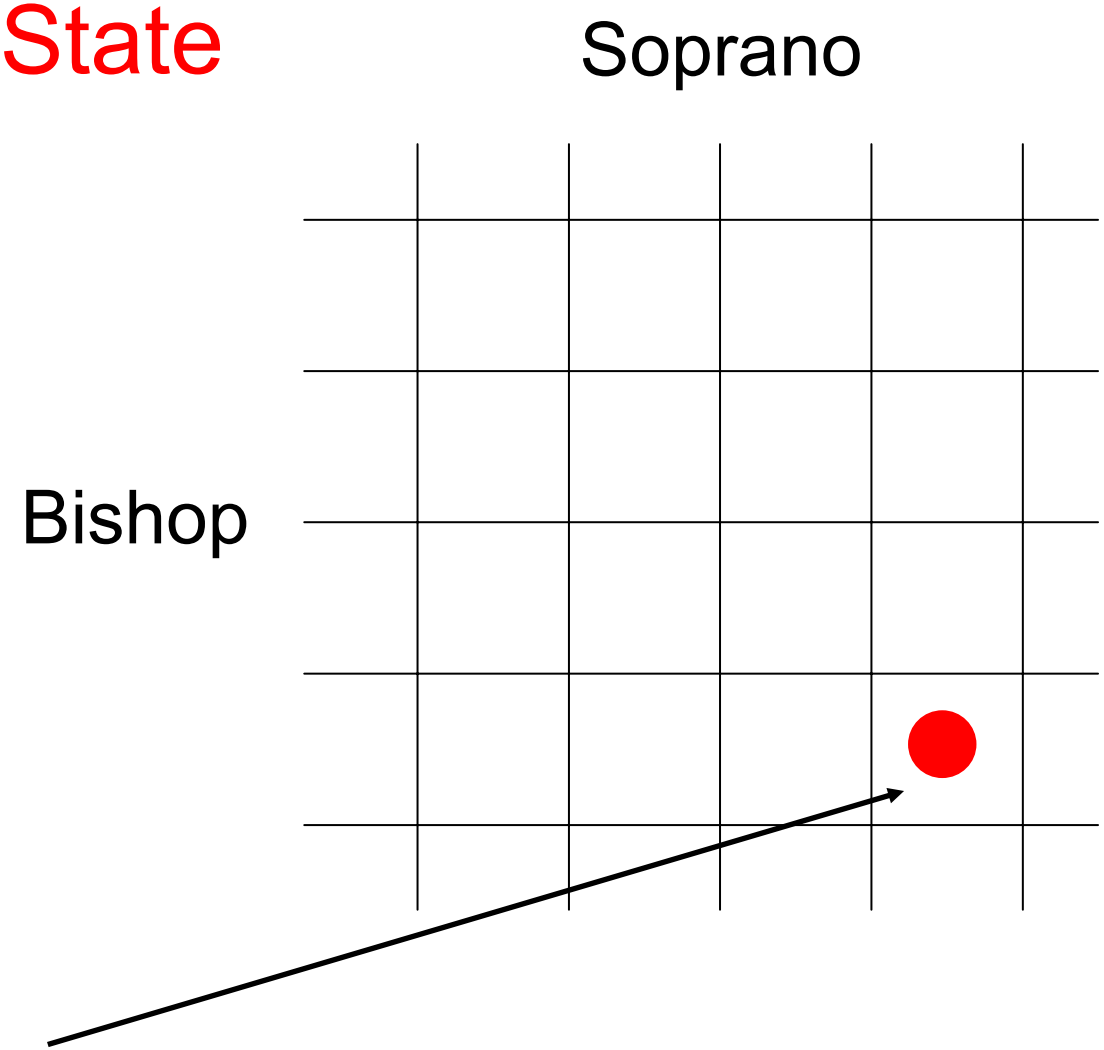
B and S bargain over the set C of outcomes in this matrix (no renegotiation, to outside C)

Lilac State



outcome that maximises Nash product u^B x u^S in Lilac State

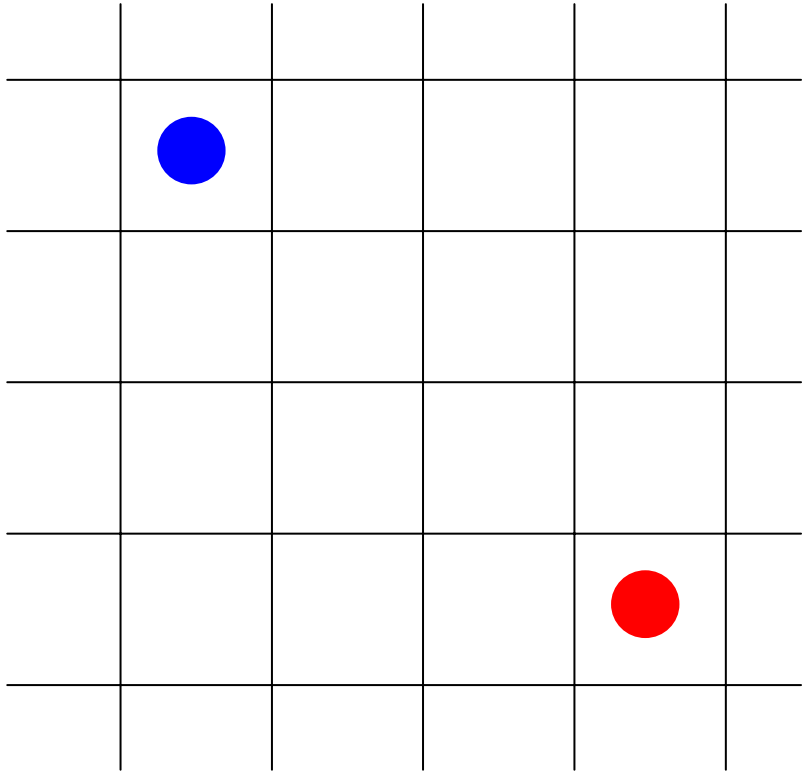
Red State



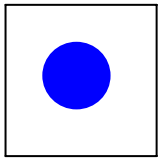
outcome that maximises
Nash product u^B x u^S
in Red State

Soprano

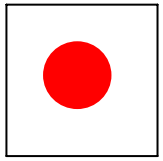
Bishop

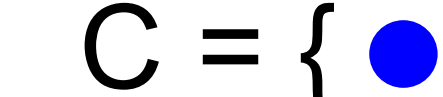


Soprano



Bishop



C = {  }

New way to think about contracts:

- contracts do rule out

  pairs not in C cannot be

  selected at date 1

New way to think about contracts:

- contracts do rule out

  pairs not in C cannot be

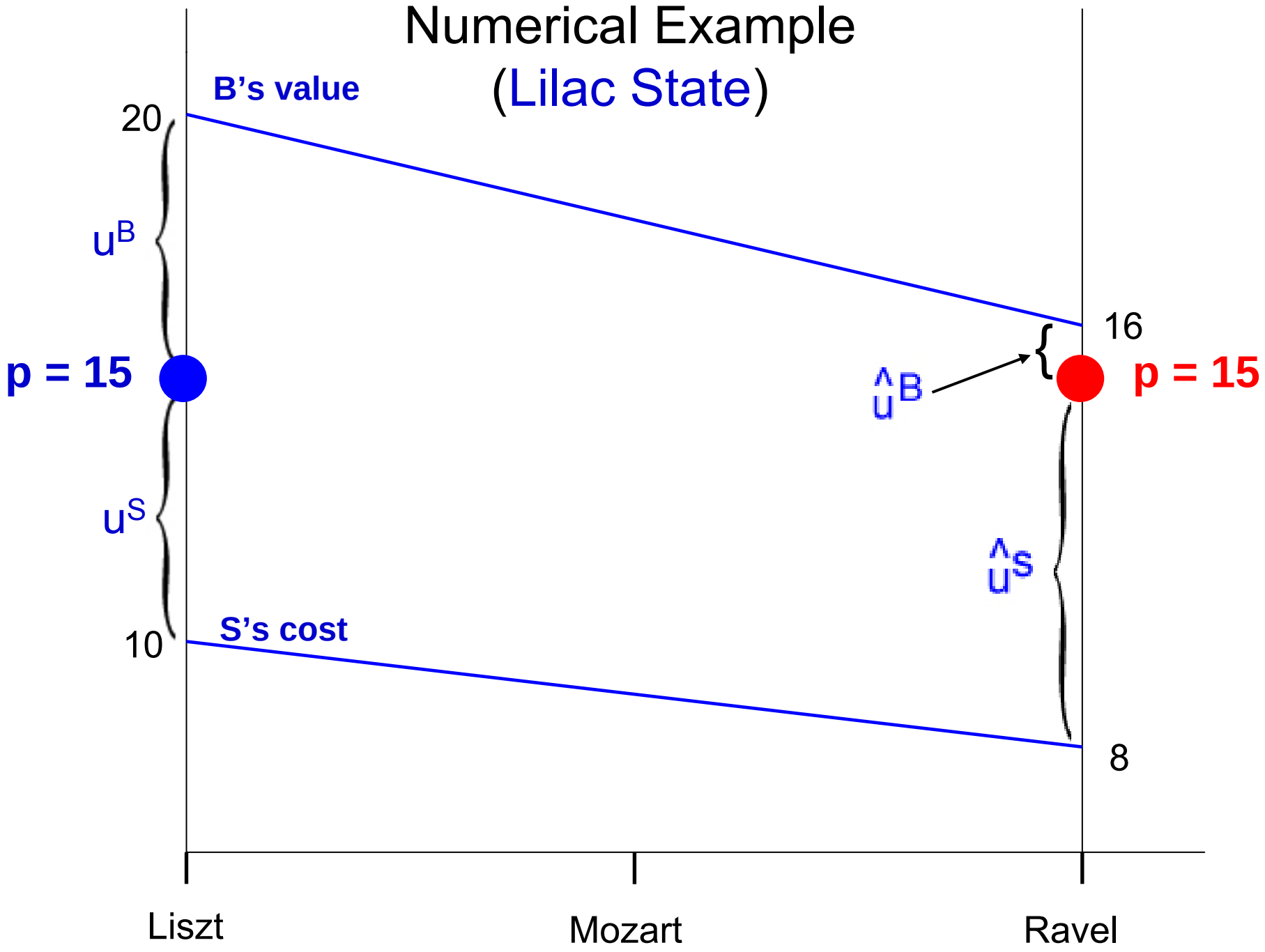
  selected at date 1: no renegotiation

but

- contracts do not rule in

  no mechanism is stipulated for

  selecting a pair in C


Numerical Example
(Lilac State)
B's value
20
u^B
p = 15
u^S
10
S's cost
16
$\hat{u}^B$
p = 15
$\hat{u}^S$
8
Liszt
Mozart
Ravel

Thus if p and p split date 1 surplus equally:

in Lilac State parties choose Liszt
(efficient!)

and, symmetrically,

in Red State parties choose Ravel
(efficient!)

Actually, these music/price pairs are the equilibrium outcomes from “No Contract”

Unequal split of date 1 surplus?

e.g. at date 0, the parties need a higher u^B

- the Bishop may have to make a non-contractible, relationship-specific investment at date ½; and u^B must be enough to cover his sunk cost

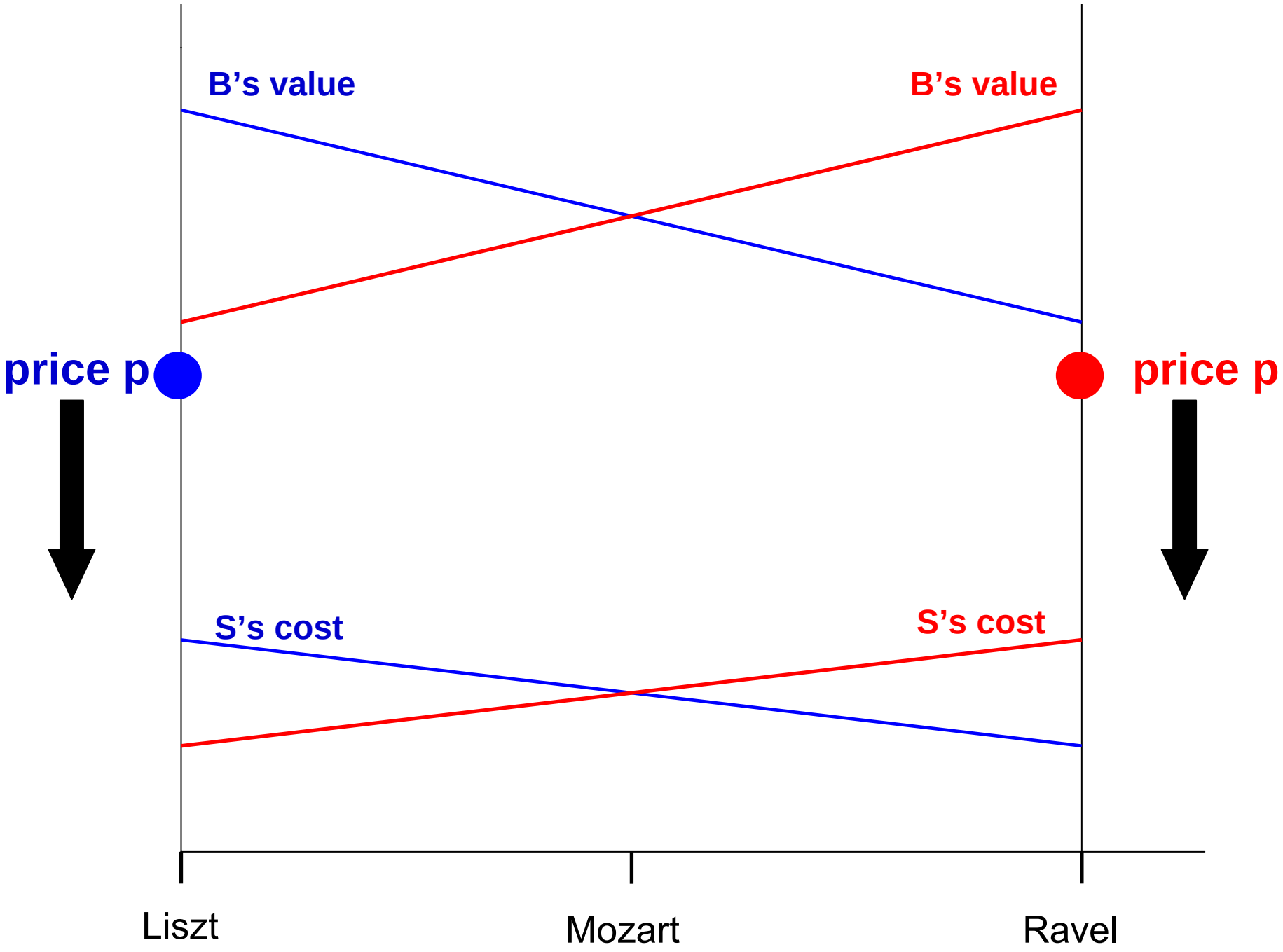
  (in this investment model, Judge cannot distinguish firing from quitting)

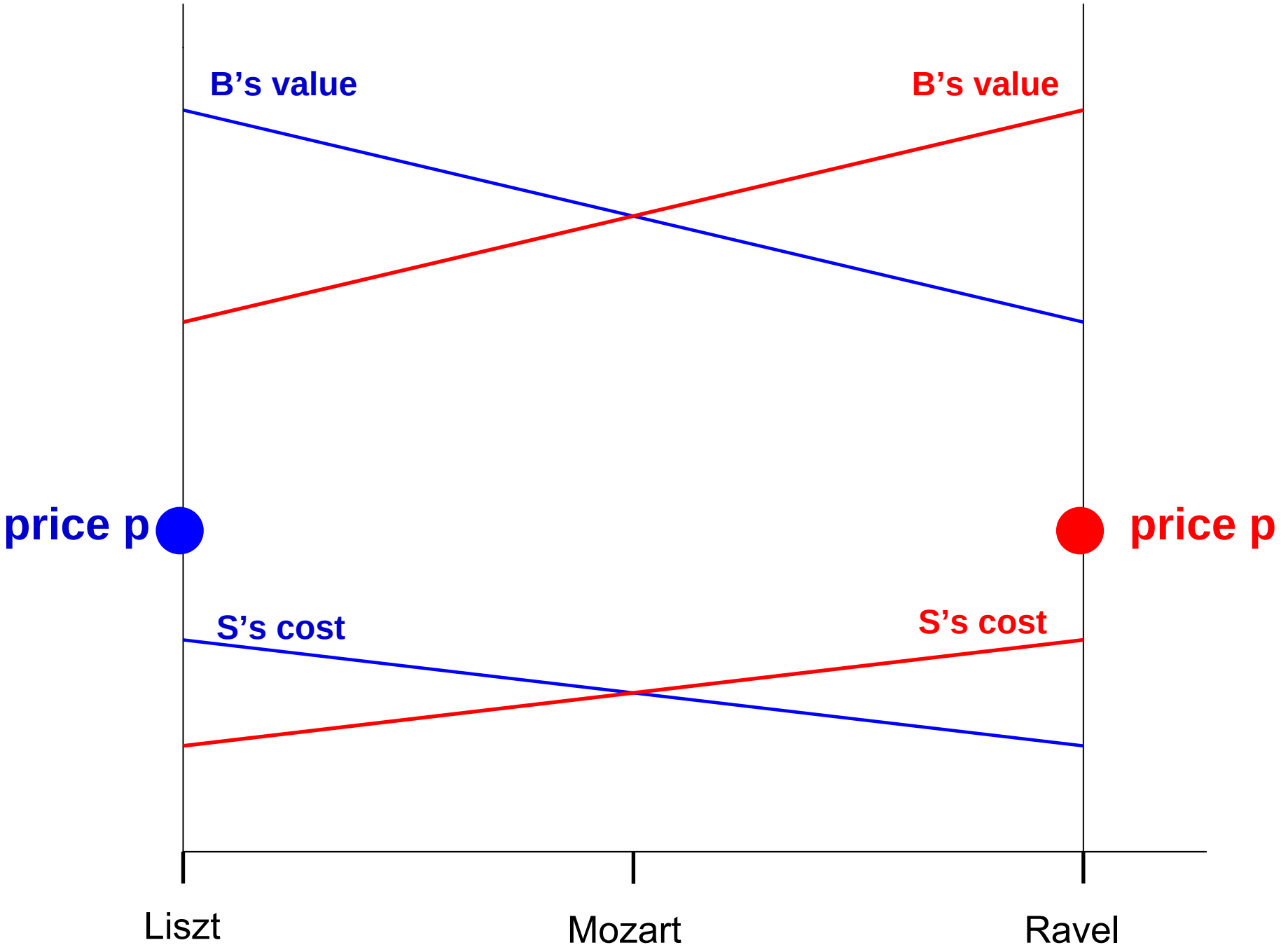
Unequal split of date 1 surplus?

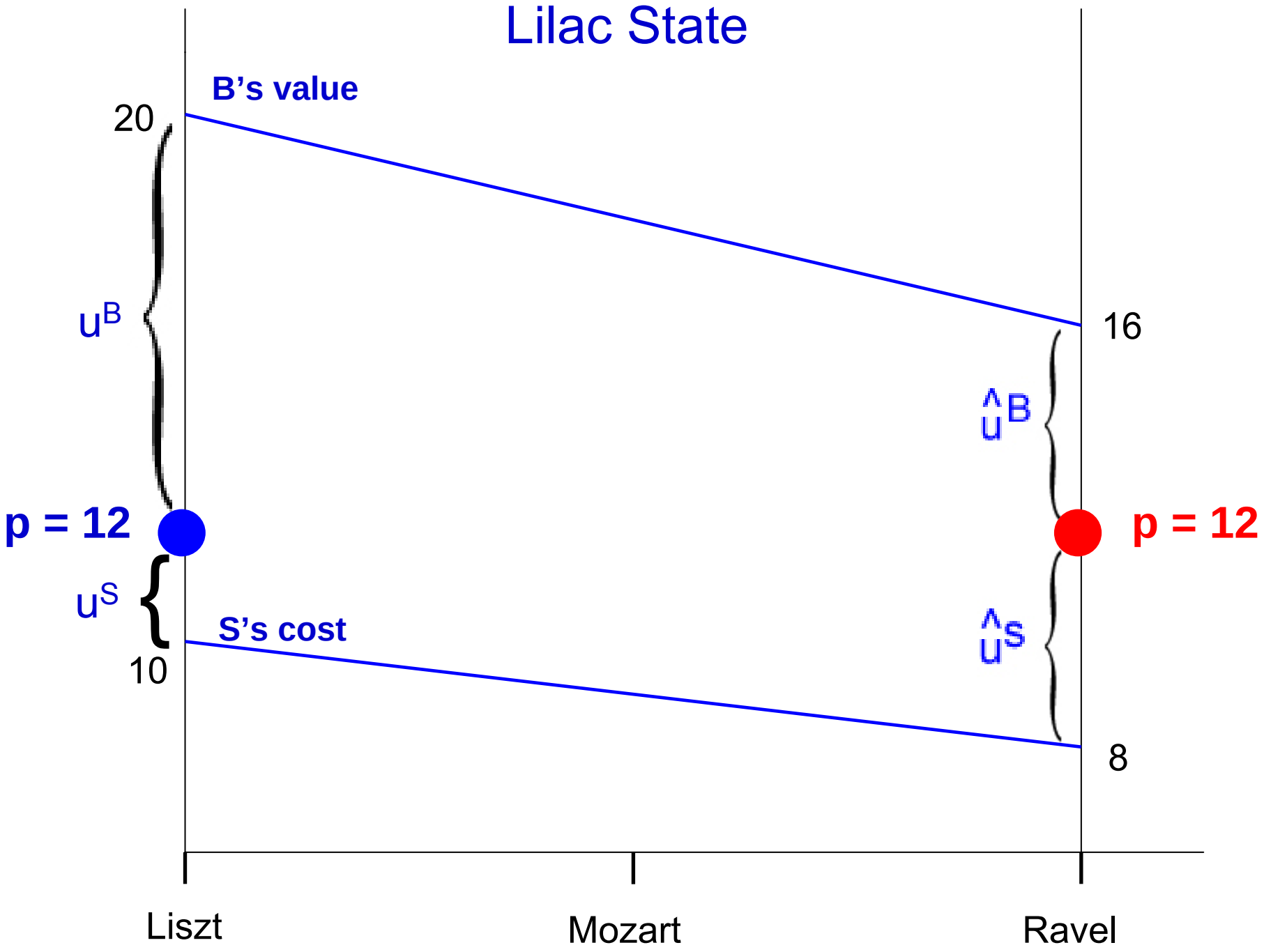
e.g. at date 0, the parties need a higher u^B

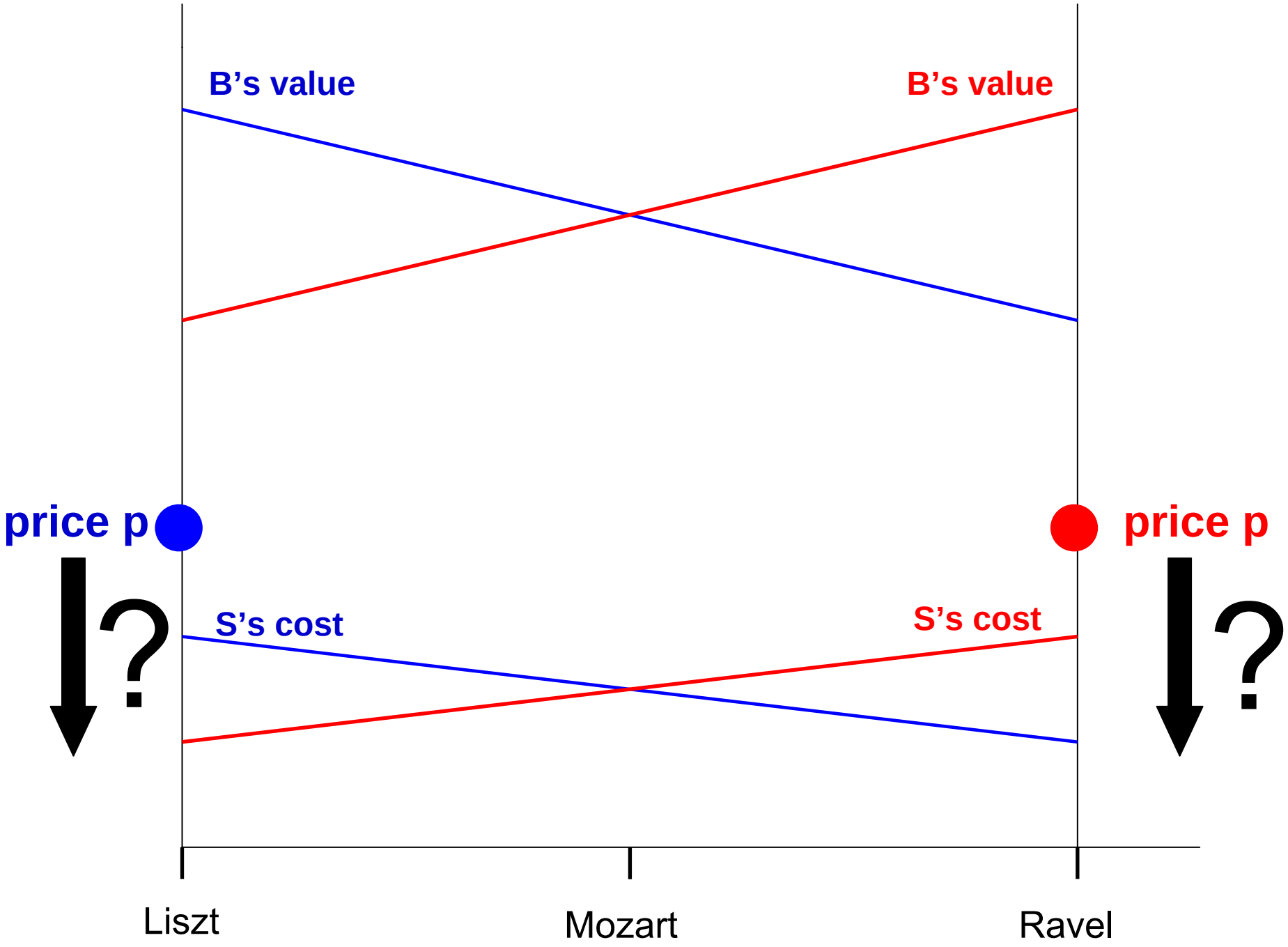
- the Bishop may have to make a non-contractible, relationship-specific investment at date ½; and u^B must be enough to cover his sunk cost

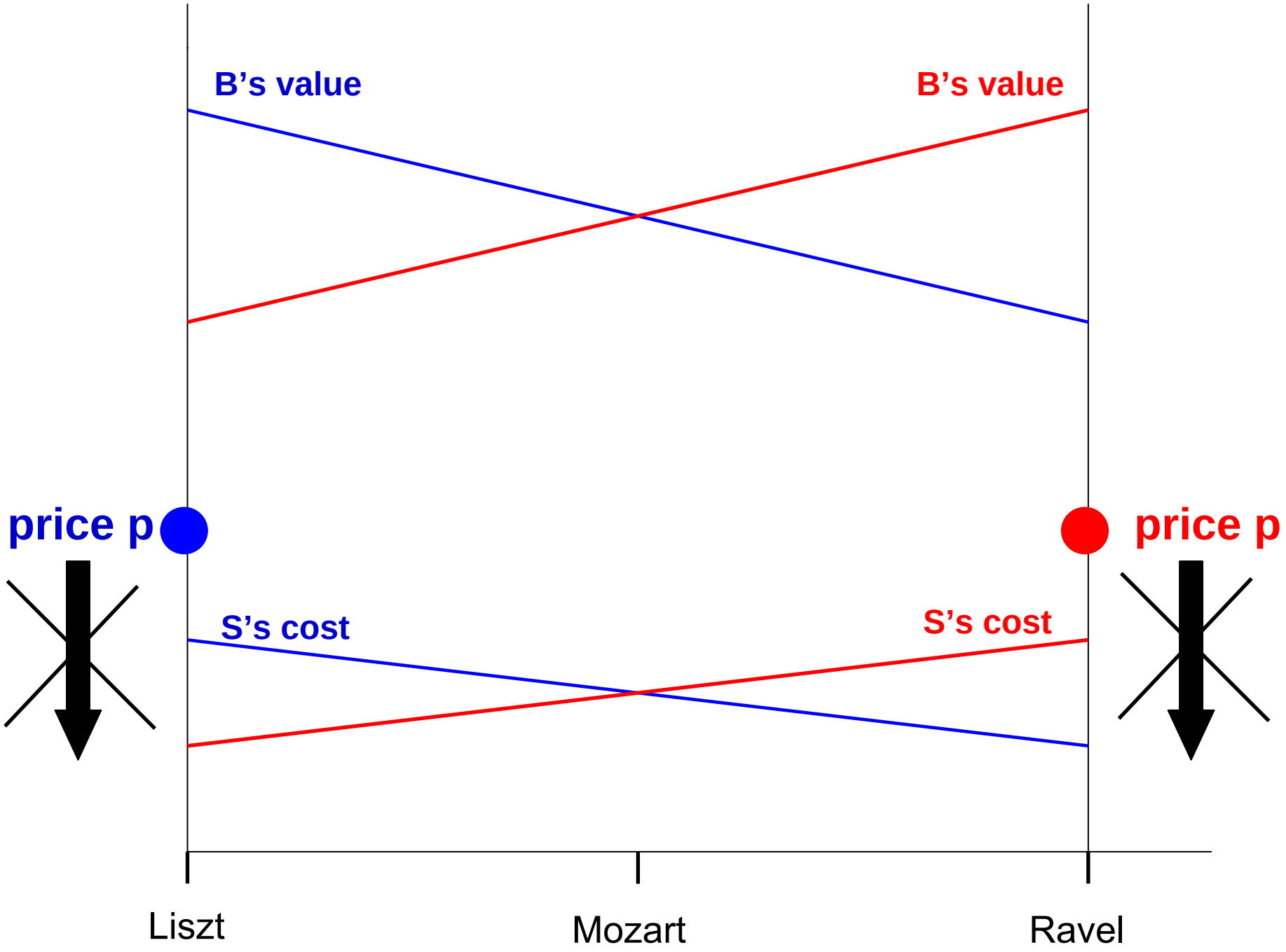
- date 0 market-clearing price may be low (any upfront payment is part of “price”)

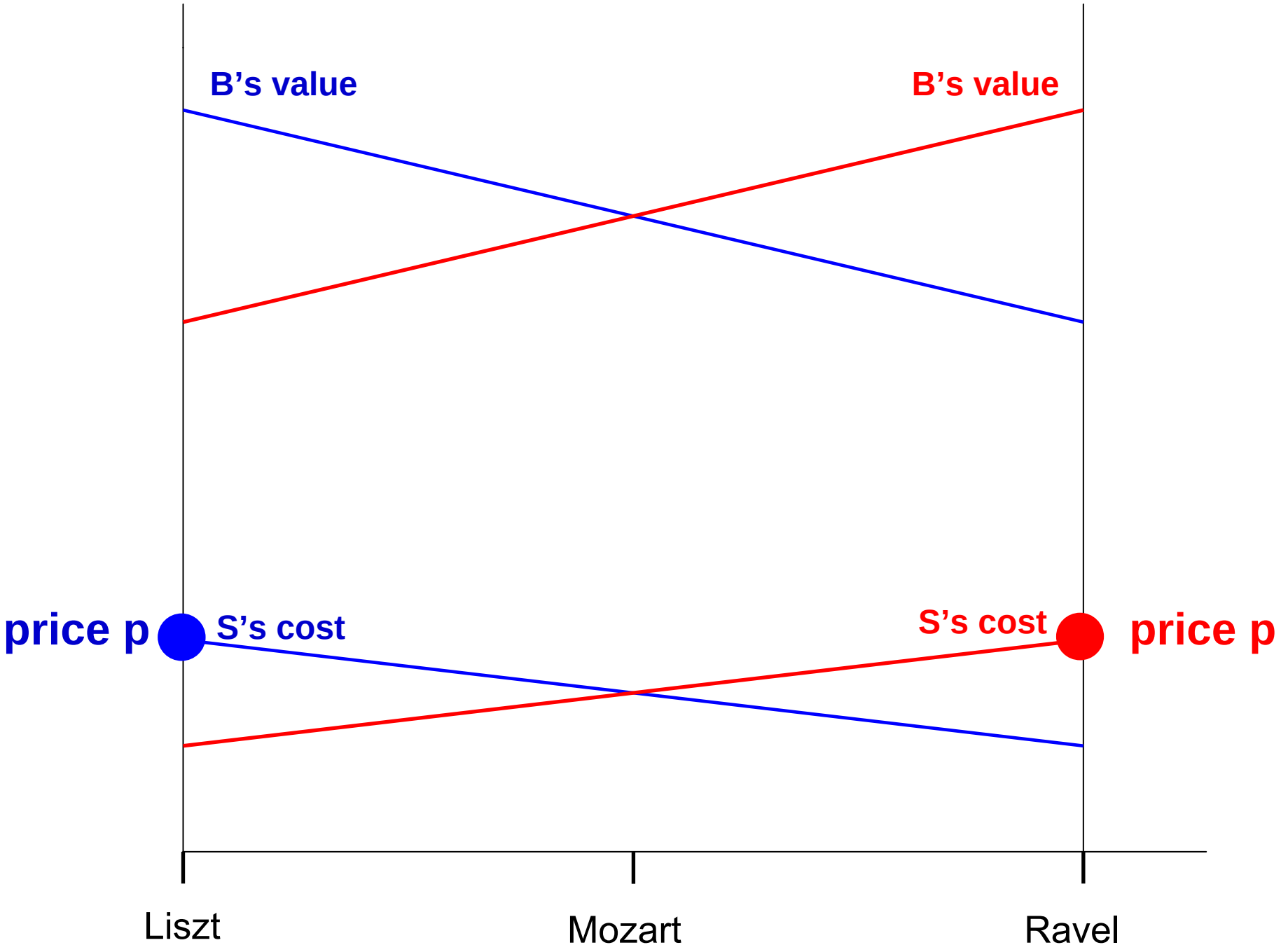

B's value
B's value
price p
price p
S's cost
S's cost
Liszt
Mozart
Ravel

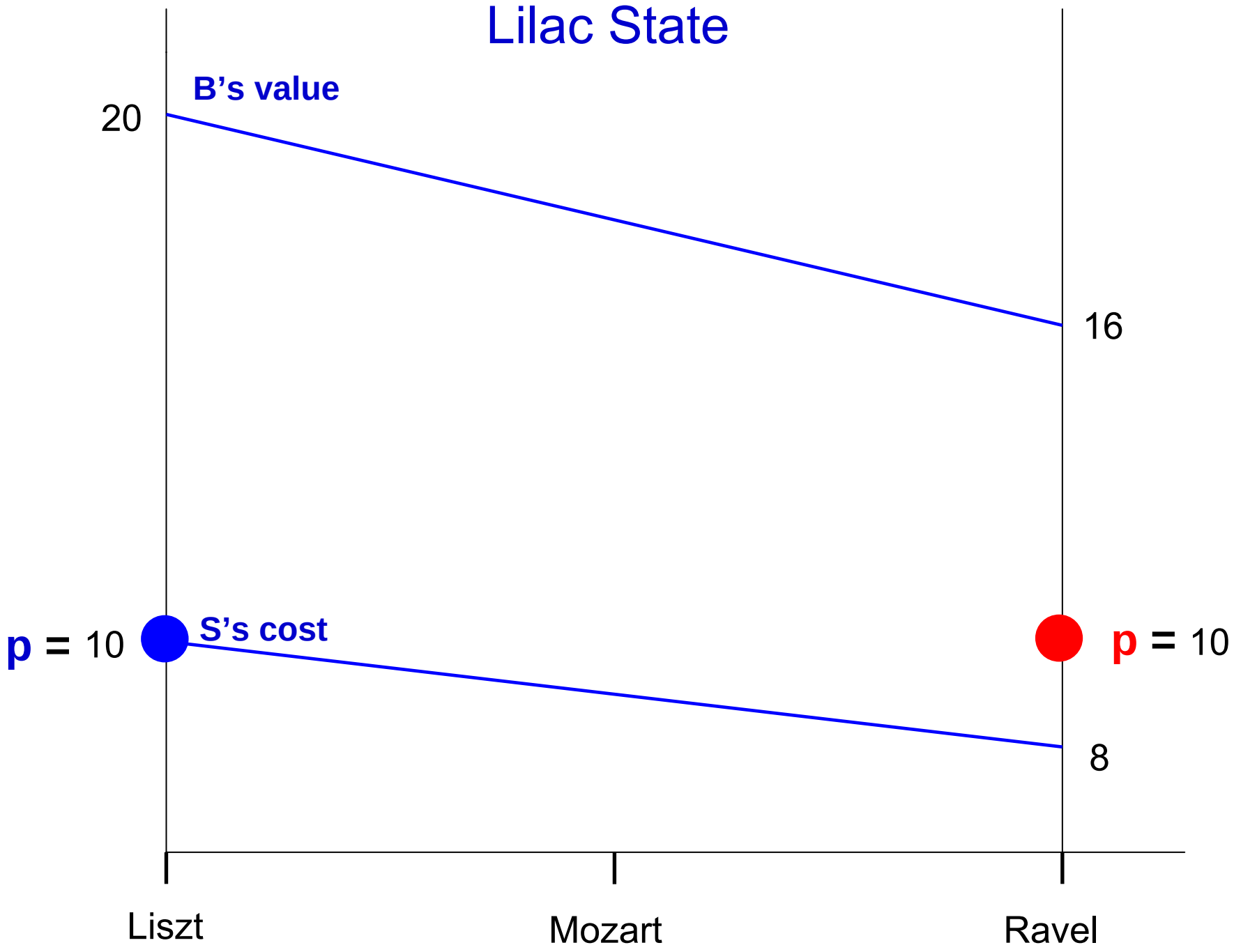

B's value
B's value
price p
price p
S's cost
S's cost
Liszt
Mozart
Ravel

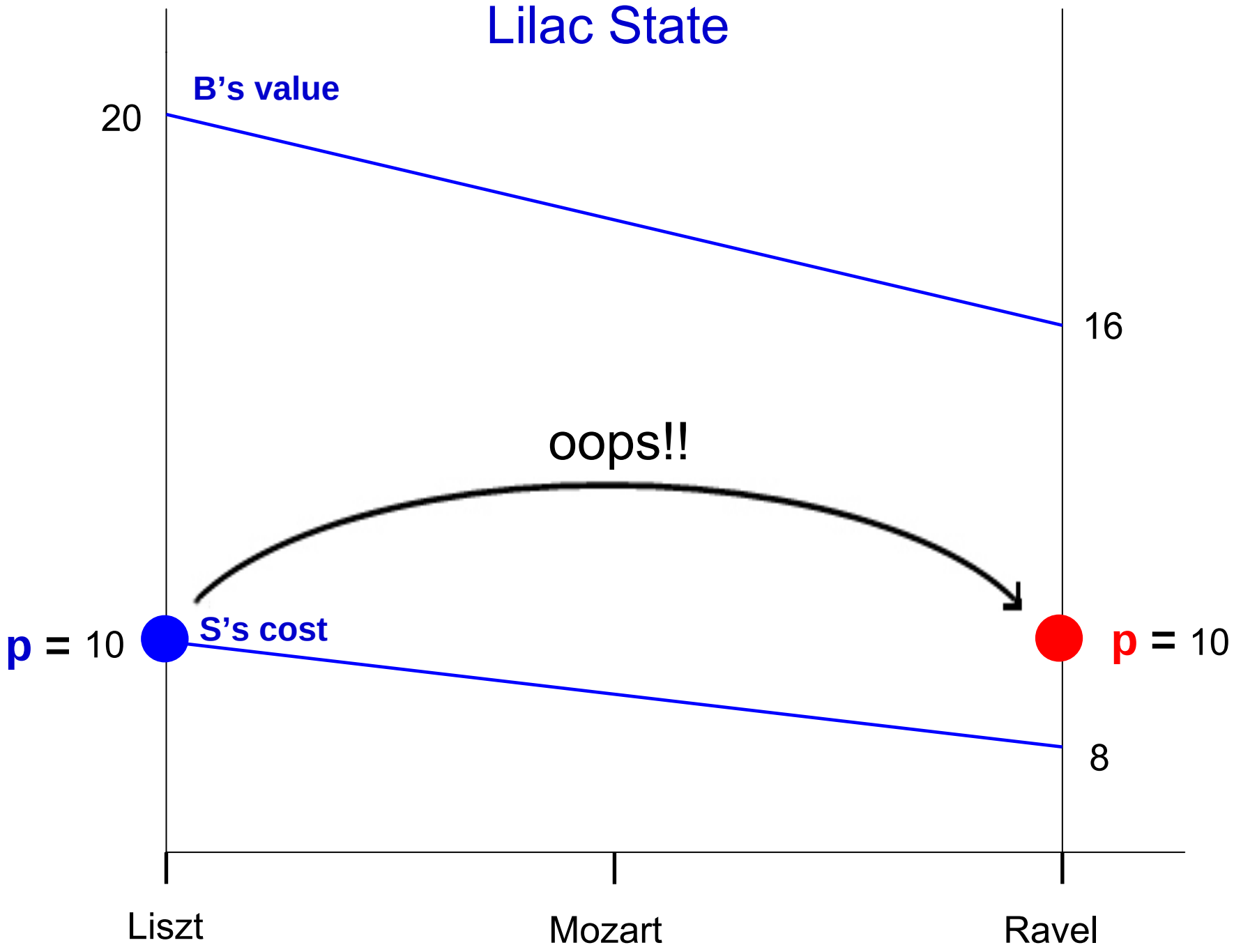

Lilac State
B's value
20
u^B
p = 12
u^S
S's cost
10
16
$\hat{u}^B$
p = 12
$\hat{u}^S$
8
Liszt
Mozart
Ravel


B's value
B's value
price p
price p
?
?
S's cost
S's cost
Liszt
Mozart
Ravel


B's value
B's value
price p
price p
S's cost
S's cost
Liszt
Mozart
Ravel


B's value
B's value
price p
S's cost
S's cost
price p
Liszt
Mozart
Ravel

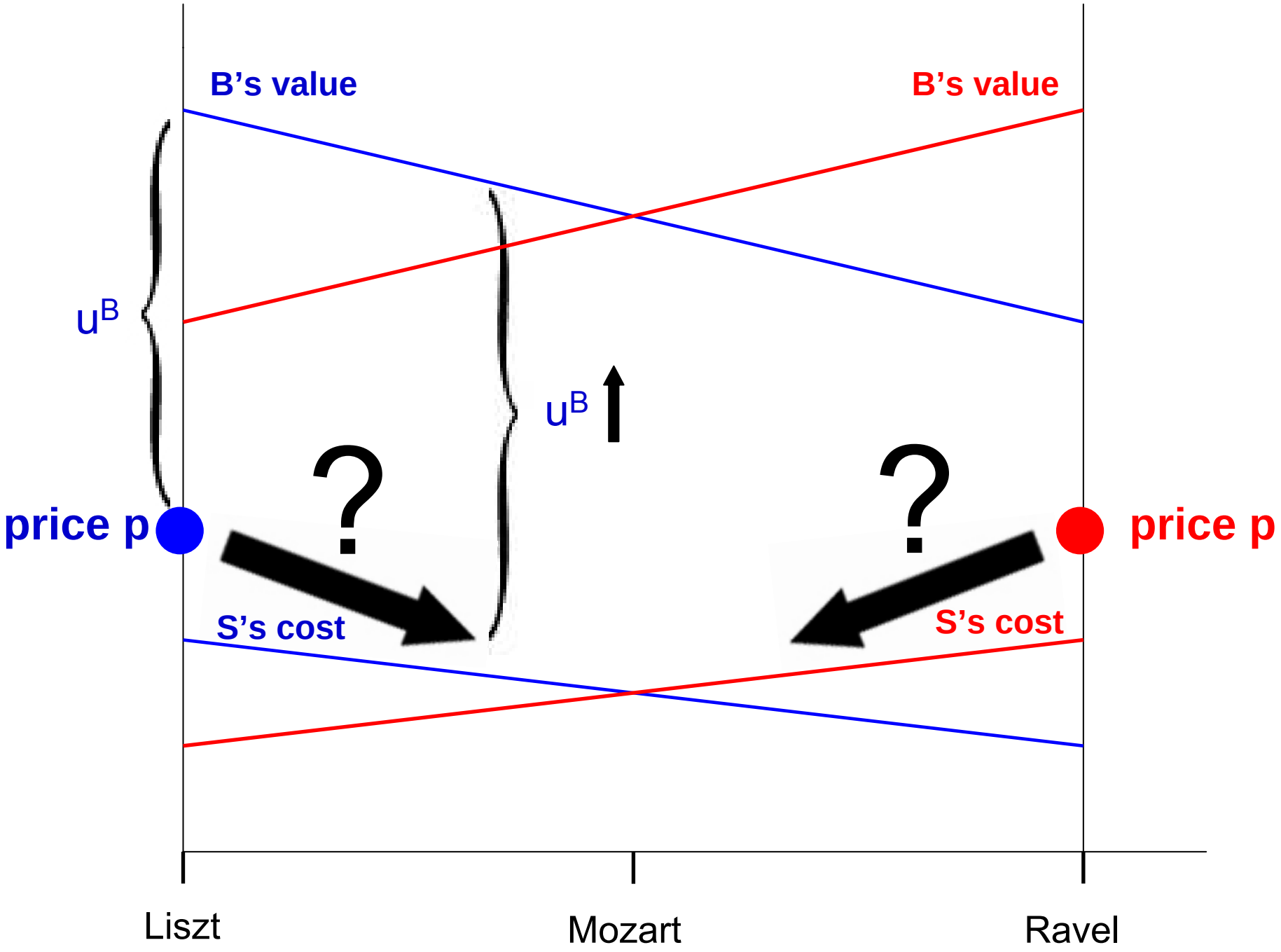

Lilac State
B's value
20
16
p = 10
S's cost
p = 10
8
Liszt
Mozart
Ravel

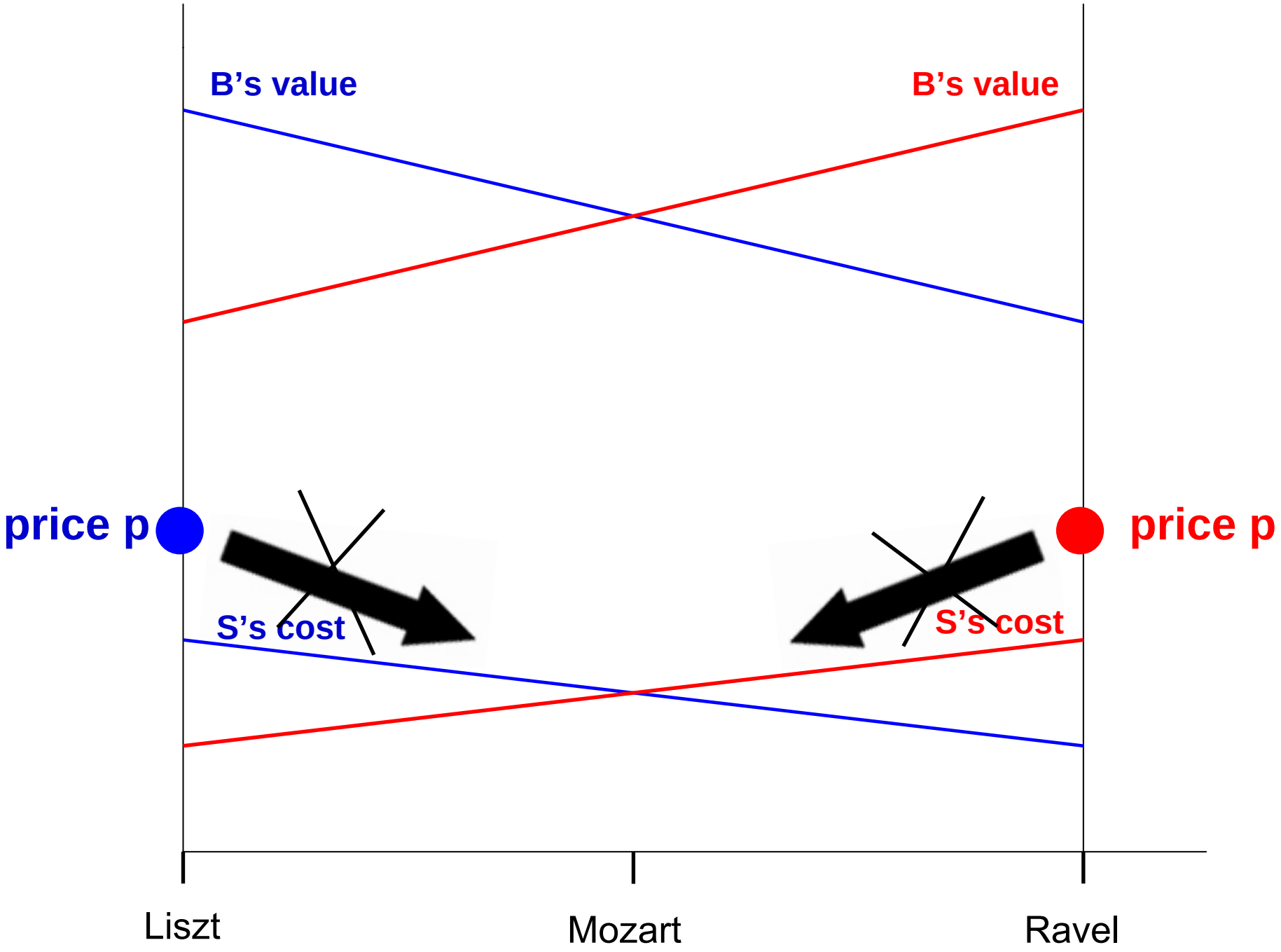

Lilac State
B's value
20
16
oops!!
p = 10
S's cost
p = 10
8
Liszt
Mozart
Ravel

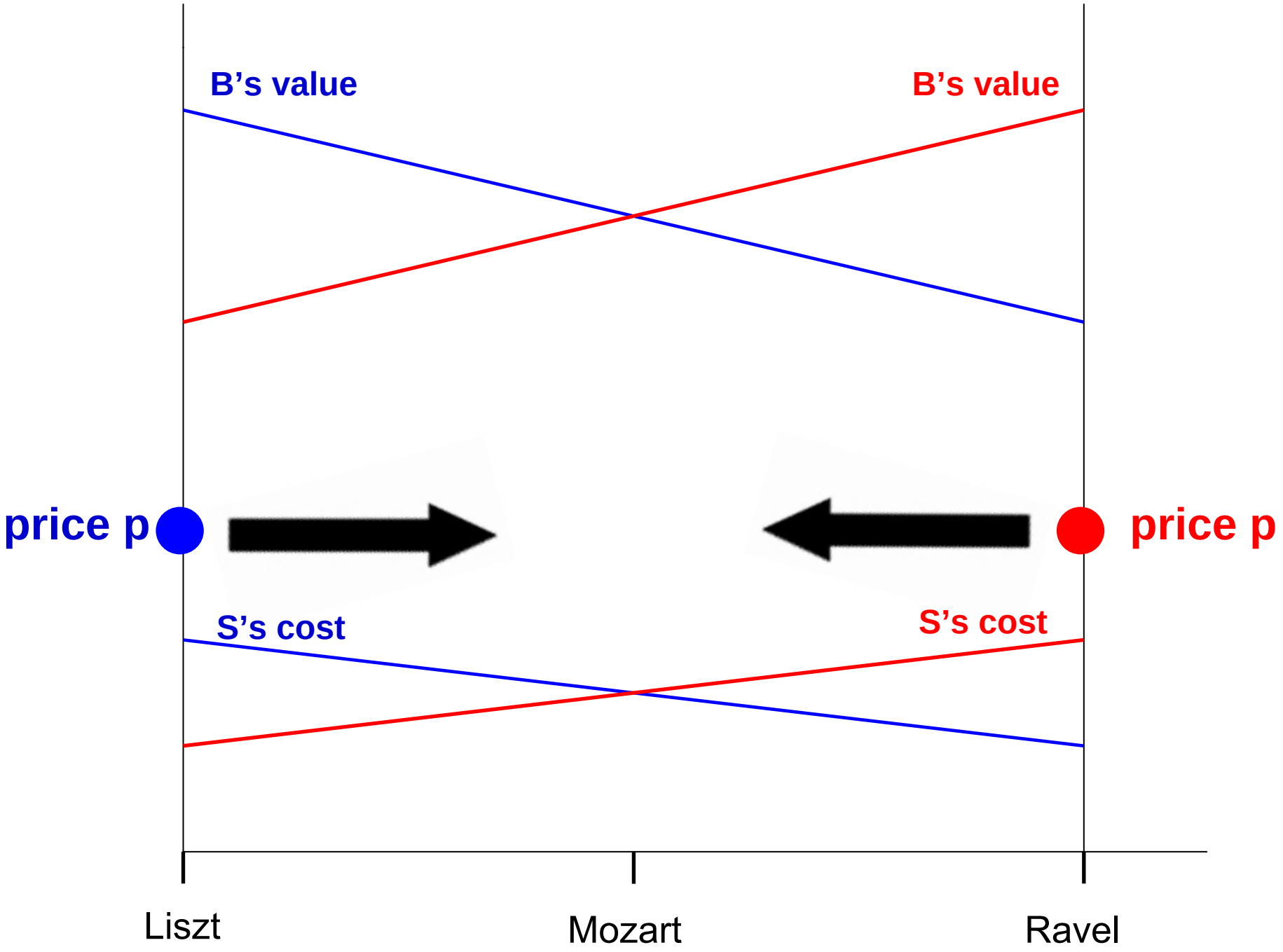
If p and p are set at too low a level,
the parties choose the least efficient music

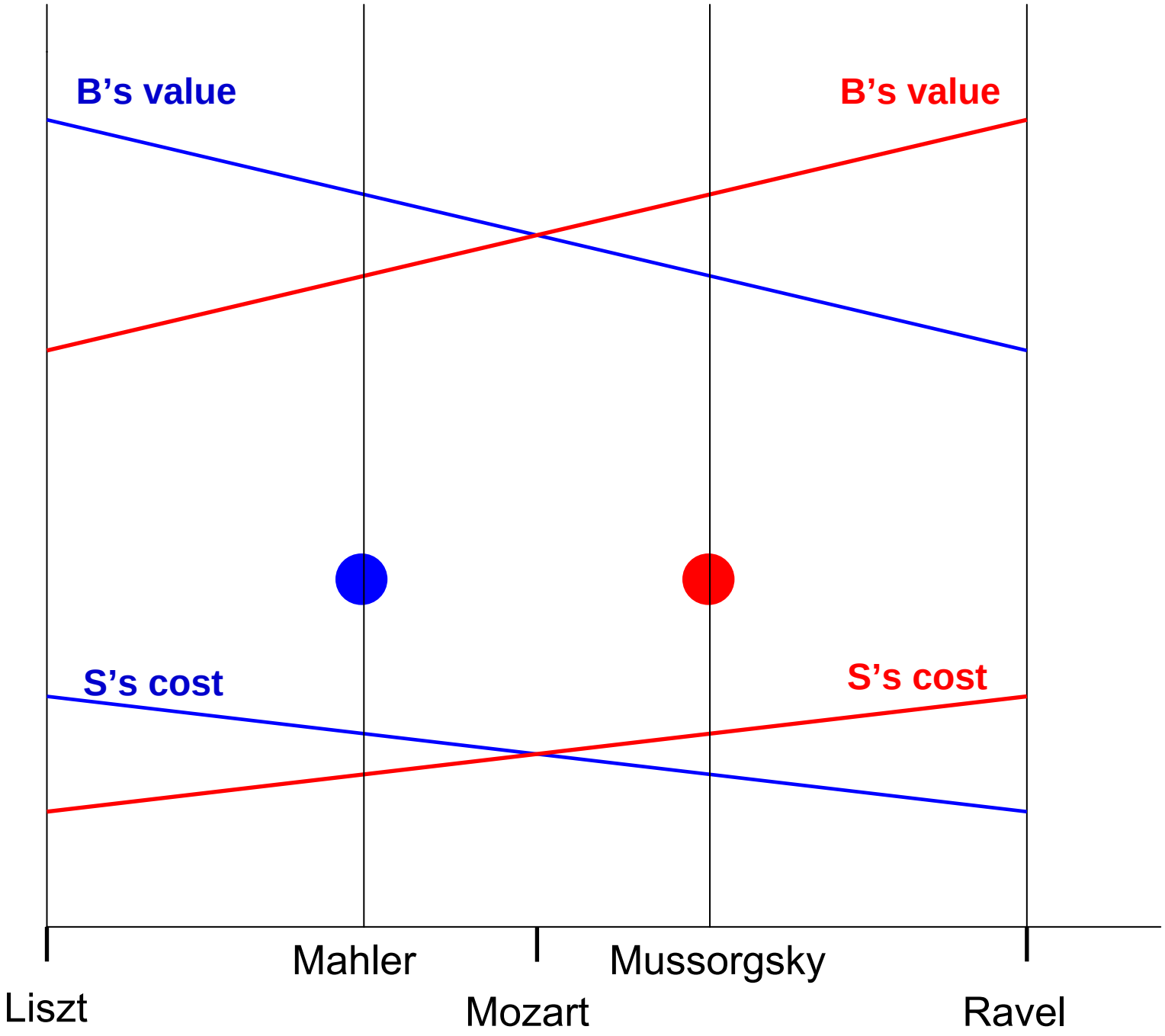
This would be worse than simply fixing the music (at Liszt, say)

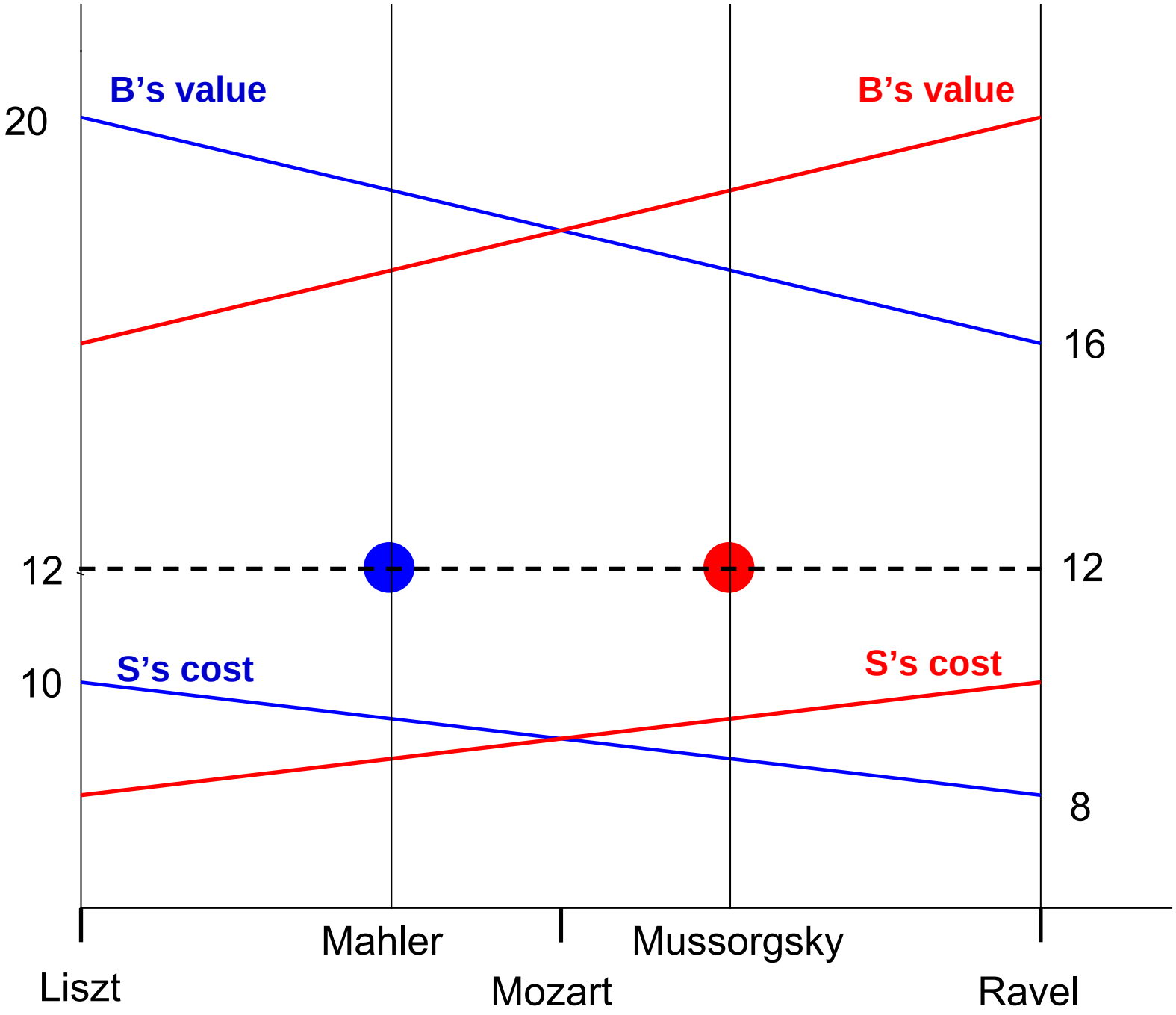
Let’s try somewhat less efficient music …


B's value
B's value
u^B
u^B
?
?
price p
price p
S's cost
S's cost
Liszt
Mozart
Ravel


B's value
B's value
price p
price p
S's cost
S's cost
Liszt
Mozart
Ravel


B's value
B's value
price p
price p
S's cost
S's cost
Liszt
Mozart
Ravel

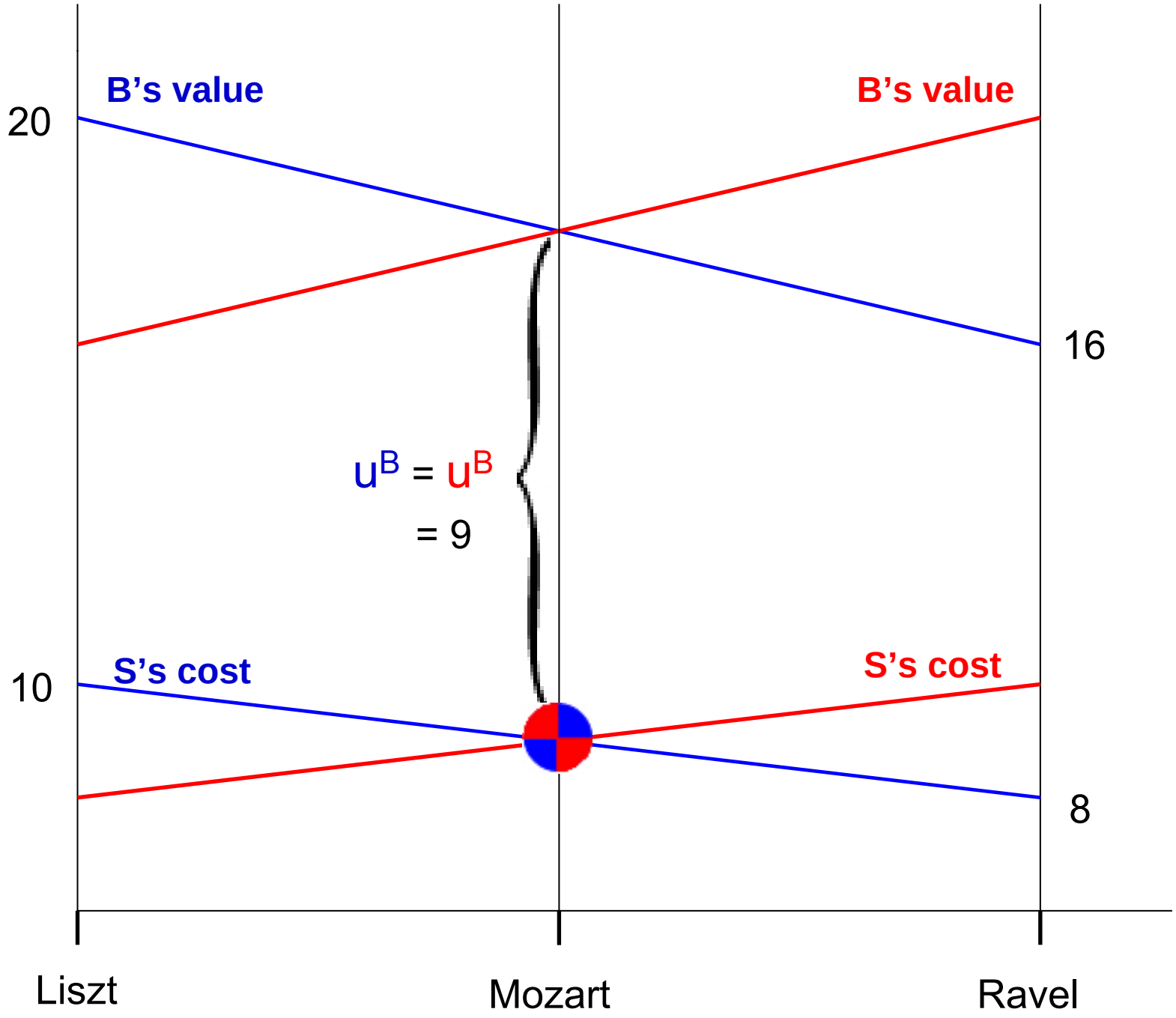

B's value
B's value
S's cost
S's cost
Liszt
Mahler
Mozart
Mussorgsky
Ravel

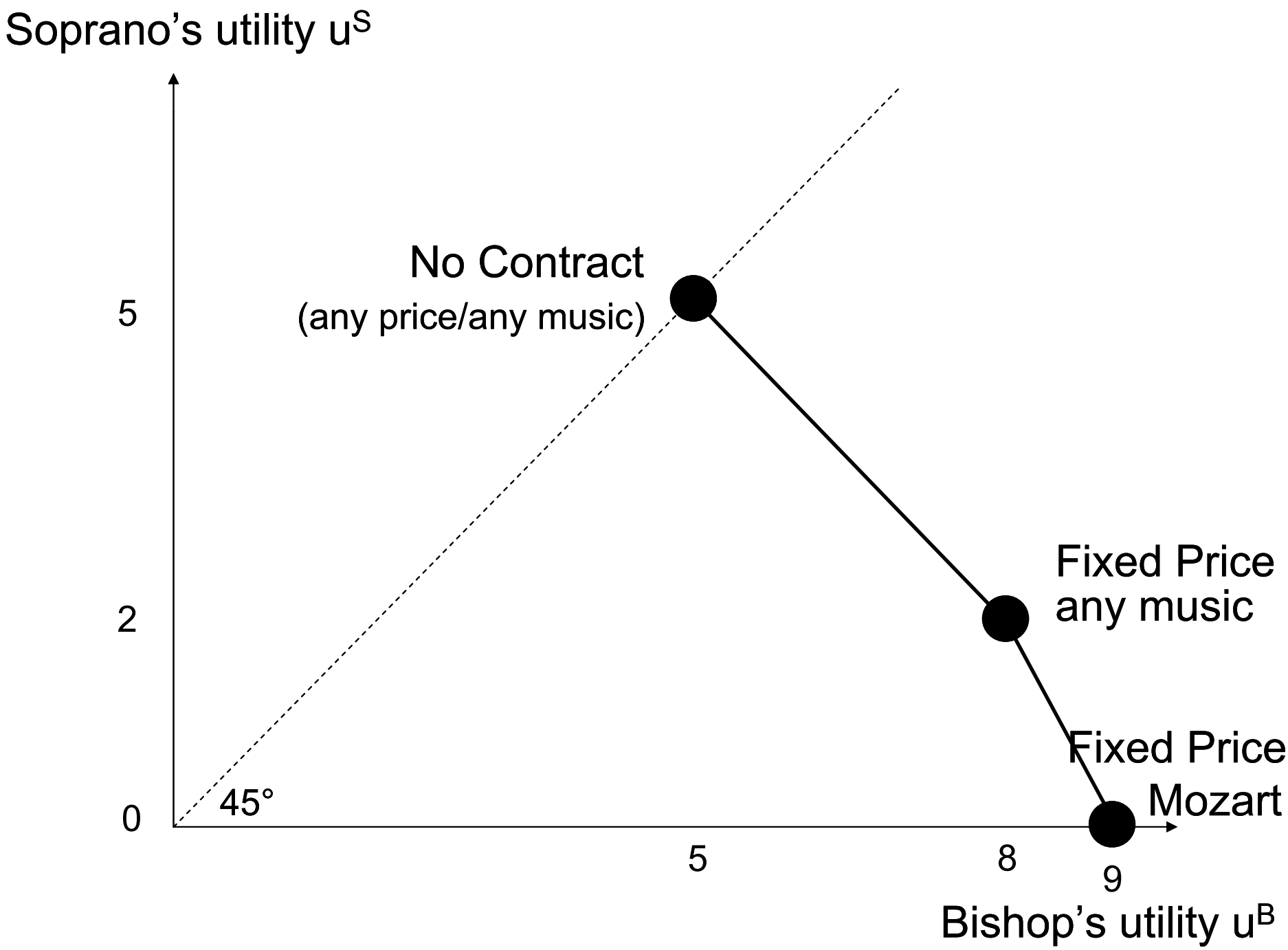

B's value
B's value
20
16
12
12
10
S's cost
S's cost
8
Liszt
Mahler
Mozart
Mussorgsky
Ravel

Unfortunately things are getting worse …

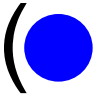
as we move away from the efficient music,
the Bishop's utility u^B is falling
(as, of course, are the gains from trade)

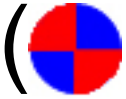
BUT there is a discontinuity at Mozart!


B's value
B's value
20
16
$u^B = u^B$
= 9
10
S's cost
S's cost
8
Liszt
Mozart
Ravel


Soprano's utility u^S
No Contract
(any price/any music)
Fixed Price
any music
Fixed Price
Mozart
45°
5
2
0
5
8
9
Bishop's utility u^B

The discontinuity arises as we reduce the dimensionality of C from one to zero:

from two spots ( and )

to one spot ()

More <u>can</u> be less!

Flexibility vs. rigidity:

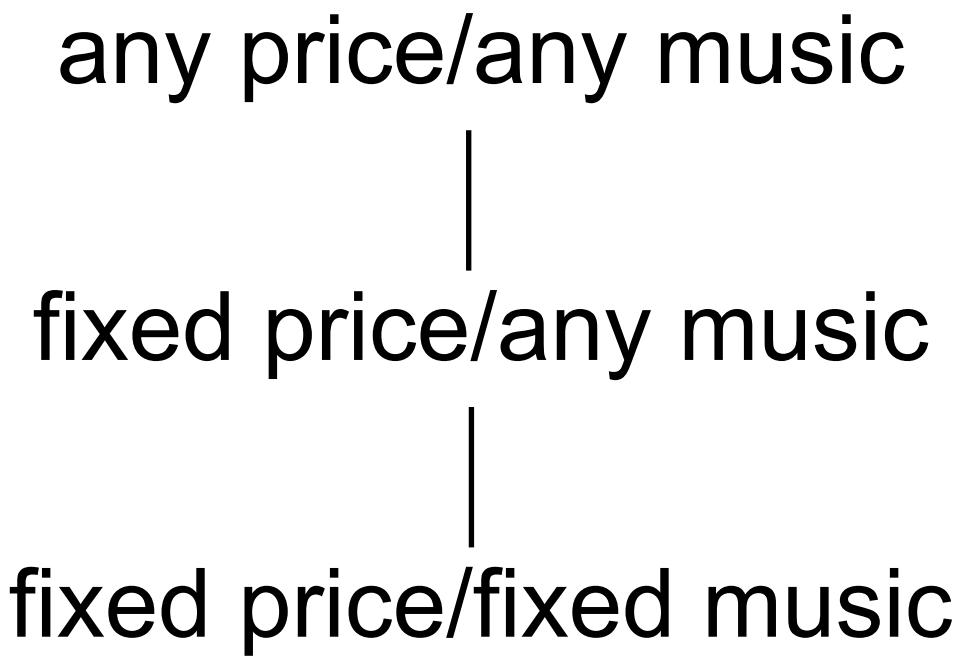
flexibility ( and )

=> more efficiency at date 1

rigidity ()

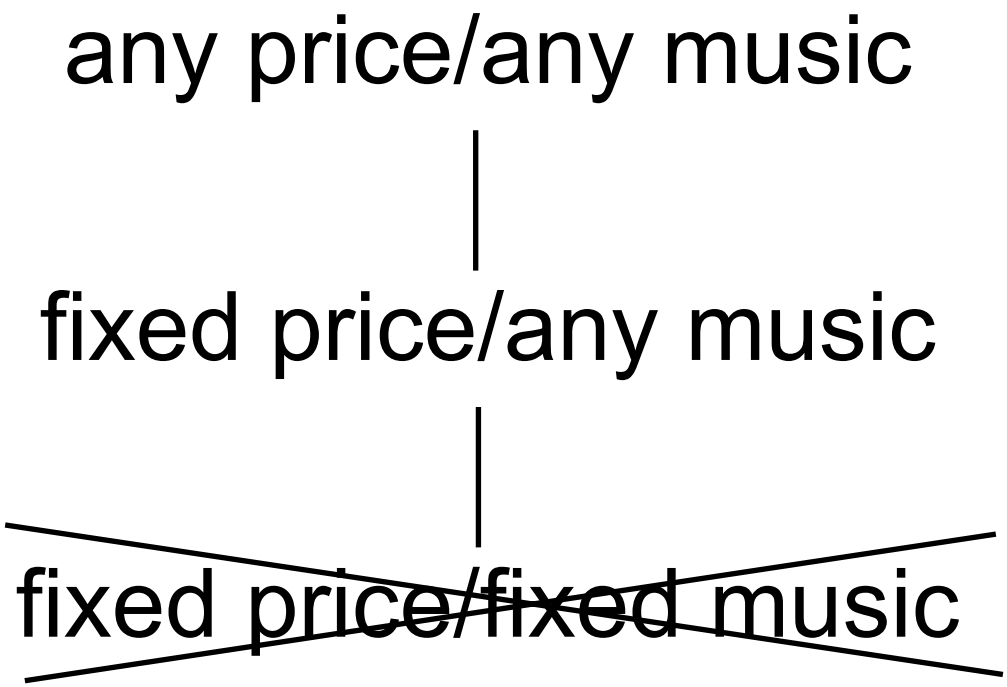
=> less opportunism at date 1

Order:



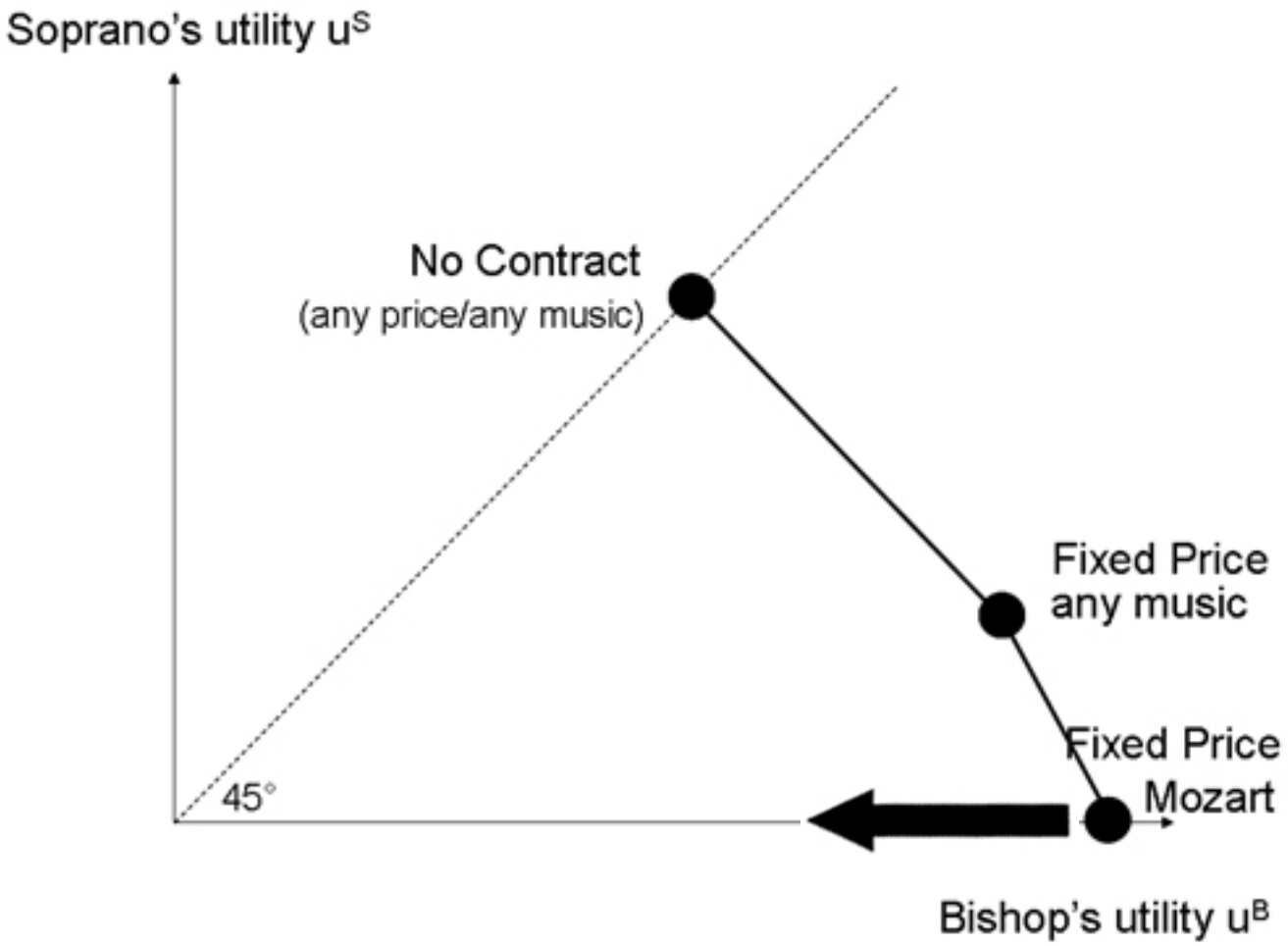
Never optimal to fix the music without fixing the price

Order:



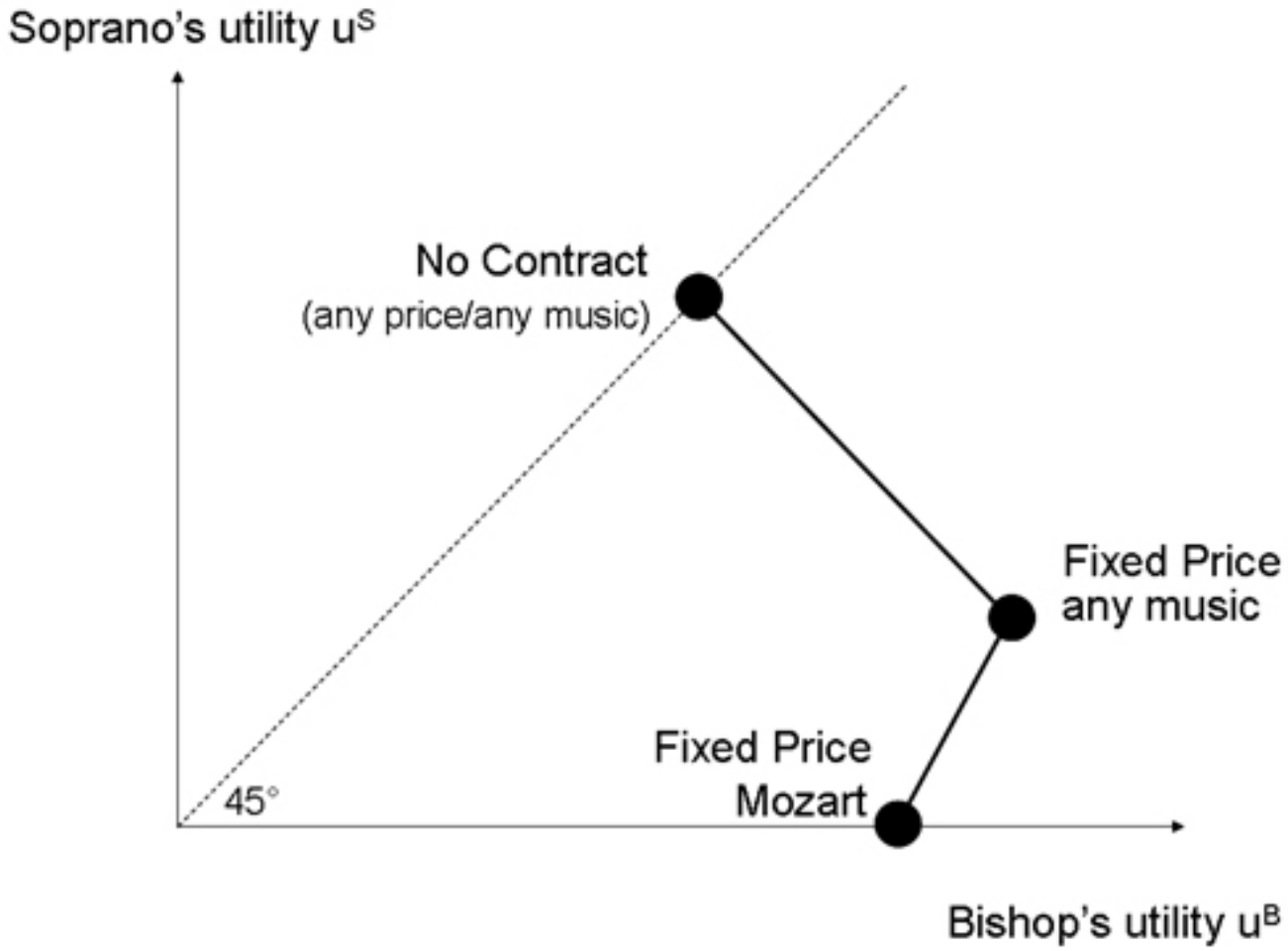
(for other parameter values)

Efficiency wages:



(for other parameter values)

Efficiency wages:



Keynes?

Employment contracts

Fixed price/any music $\stackrel{?}{=}$ employment

B and S bargain over choice of music:
they have a common view of what is fair

(Even if B has the “legal right” to choose,
it is a right in name only)

Have we gone too far?

Can’t bosses tell subordinates what to do

– at least within reason?

More generally, contracts do stipulate mechanisms for selecting outcomes,

i.e. contracts do rule in,

– at least to some extent

PAPER 2: "Contracts as Reference Points"

(Hart-Moore, July 2006)

Suppose parties do not have a common view of what is fair

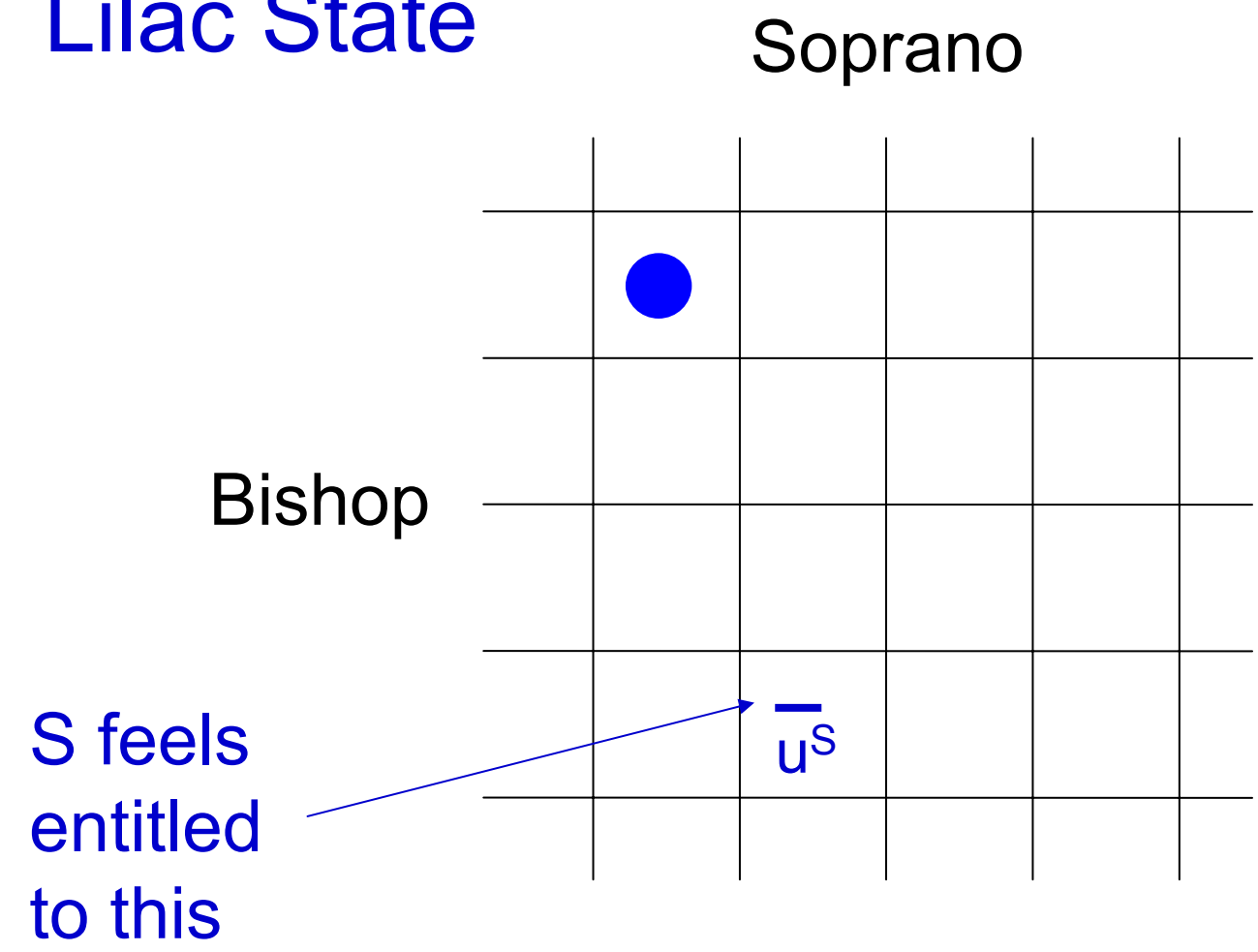
We take extreme position:

in the absence of a contract,
each party feels entitled to all the surplus

Role of contract:

to limit parties' feelings of entitlement

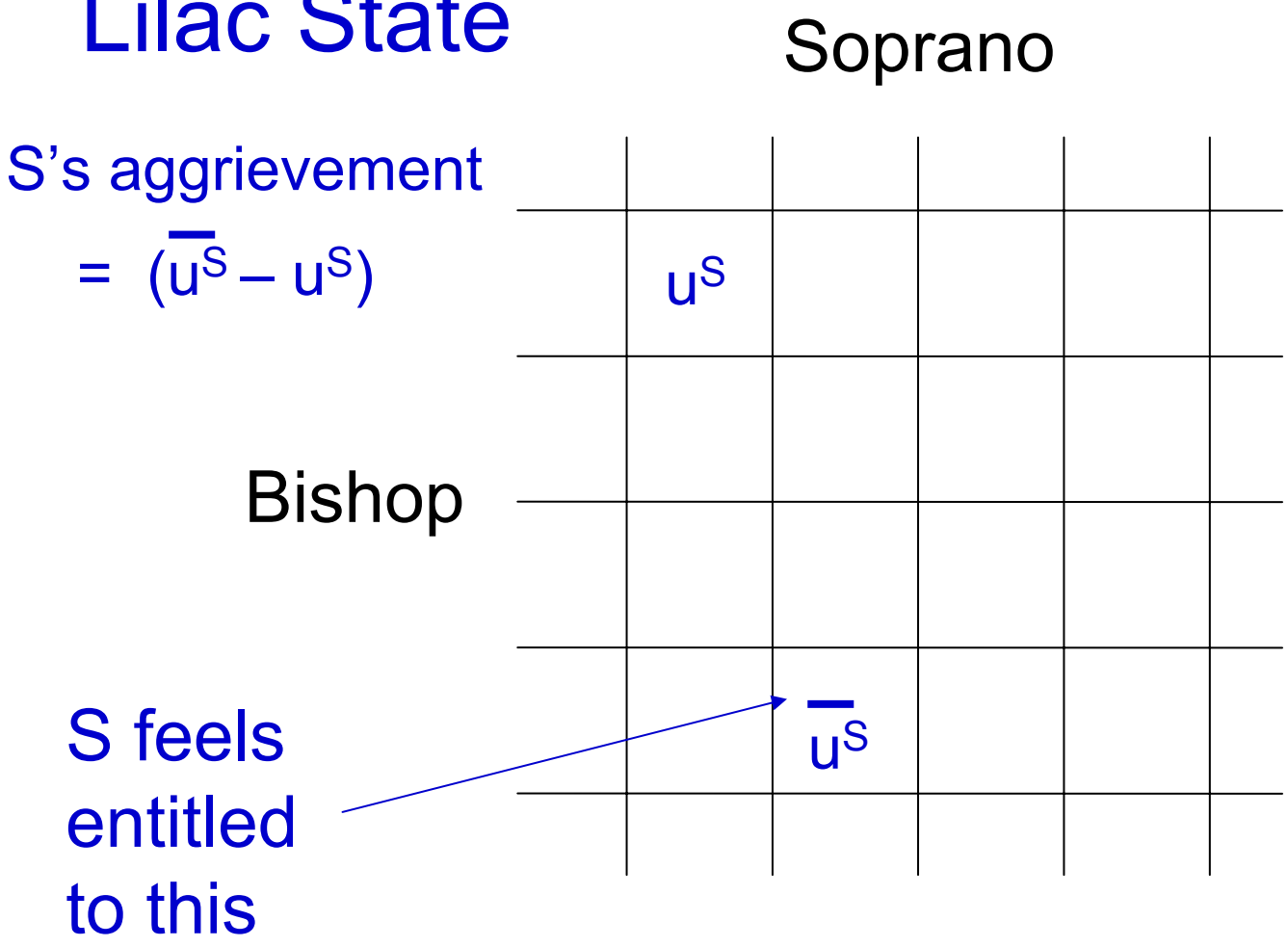
Lilac State



Role of contract:

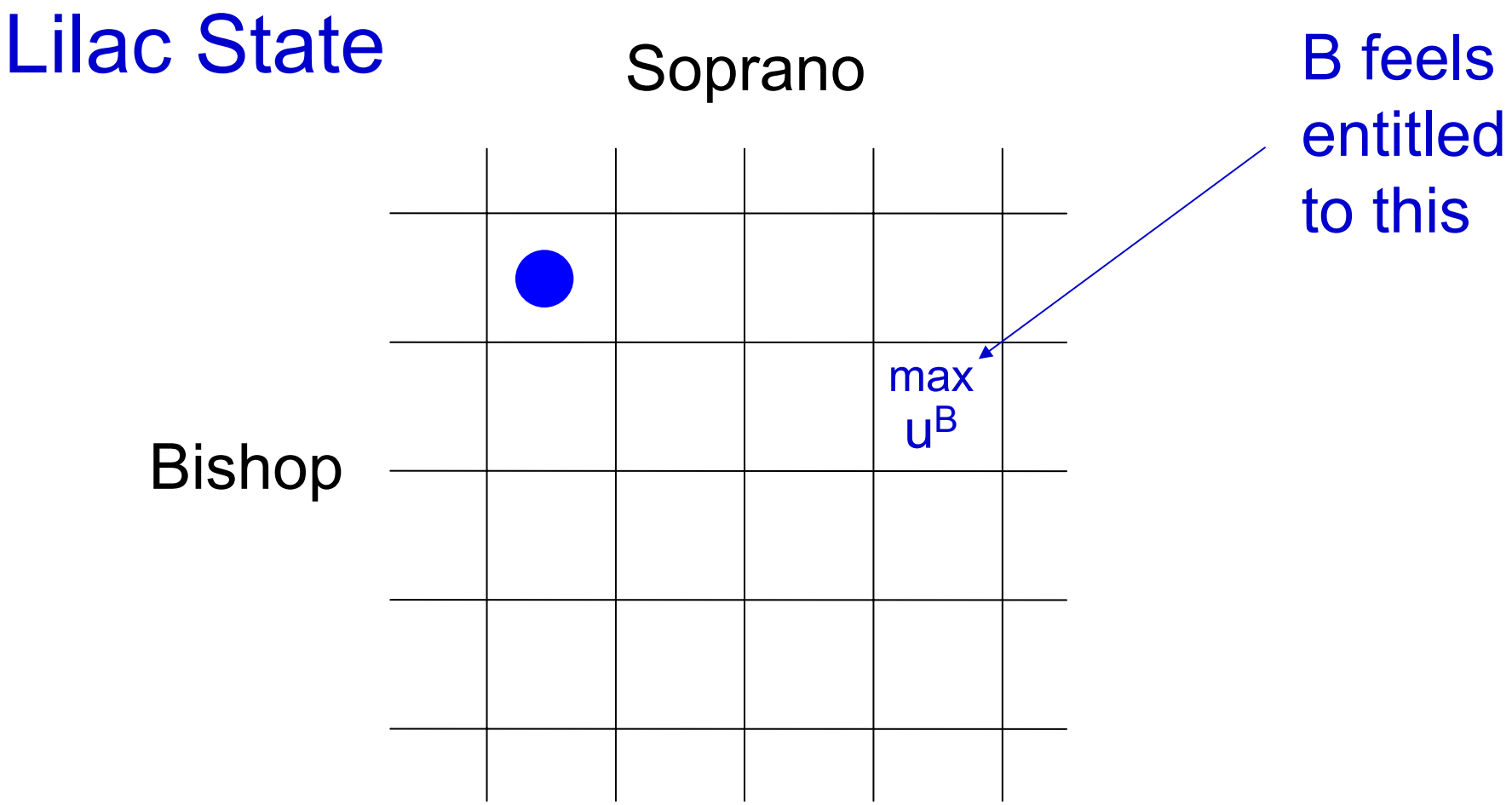
to limit parties' feelings of entitlement

Lilac State



Role of contract:

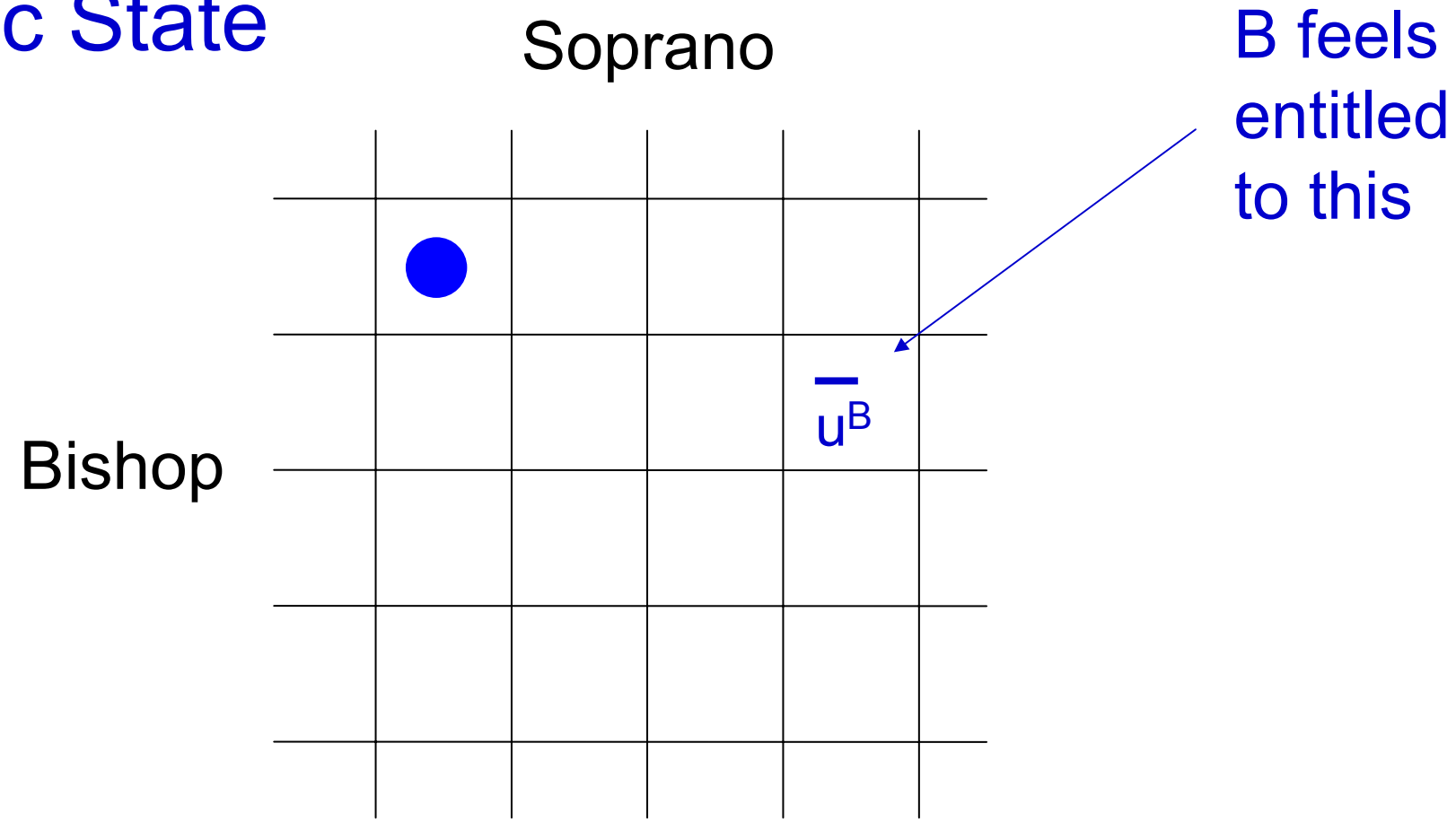
to limit parties' feelings of entitlement



Role of contract:

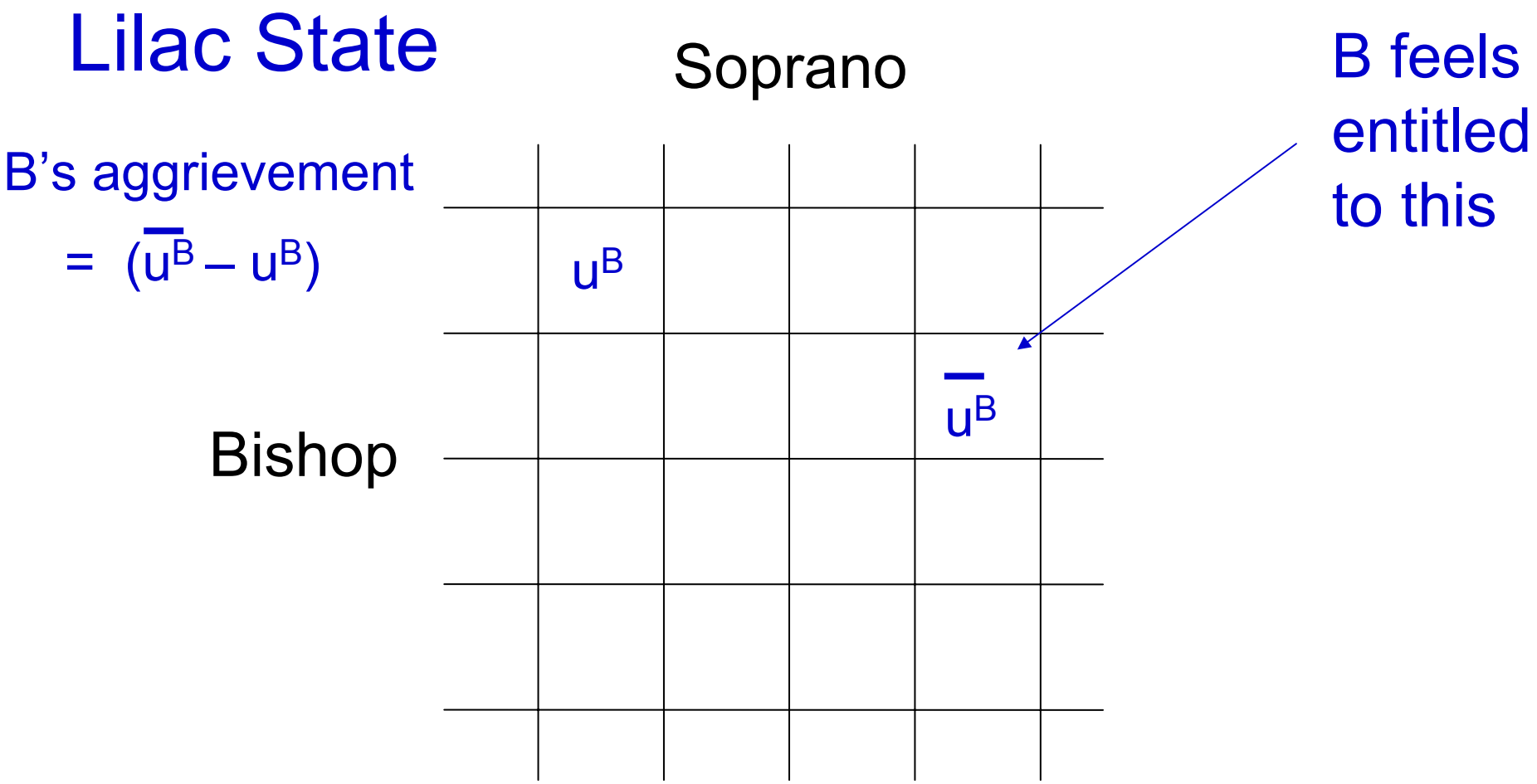
to limit parties' feelings of entitlement

Lilac State



Role of contract:

to limit parties' feelings of entitlement



Assume: parties shade their performance in proportion to how aggrieved they feel

=> loss in Lilac State equals

$$\text{Loss} = \theta \{ \bar{u}^S - u^S \} + \theta \{ \bar{u}^B - u^B \}$$

constant of proportionality

constant of proportionality

where $0 < \theta \leq 1$

Assume: parties shade their performance in proportion to how aggrieved they feel

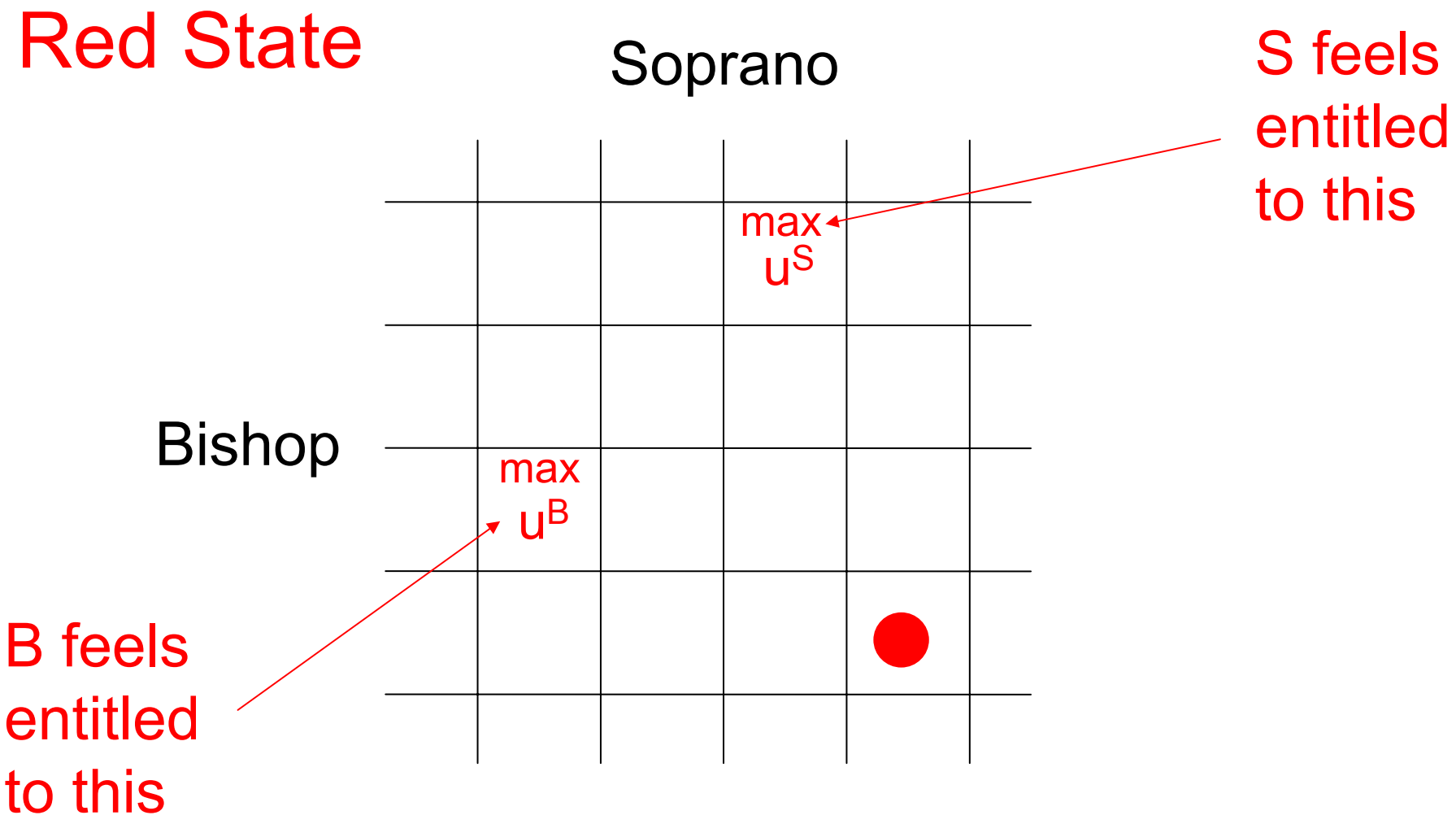
=> loss in Lilac State equals

$$\text{Loss} = \underbrace{\theta\{\bar{u}^S - u^S\}}_{\text{loss imposed on B by S's shading}} + \underbrace{\theta\{\bar{u}^B - u^B\}}_{\text{loss imposed on S by B's shading}}$$

NB: own utility is unaffected by own shading

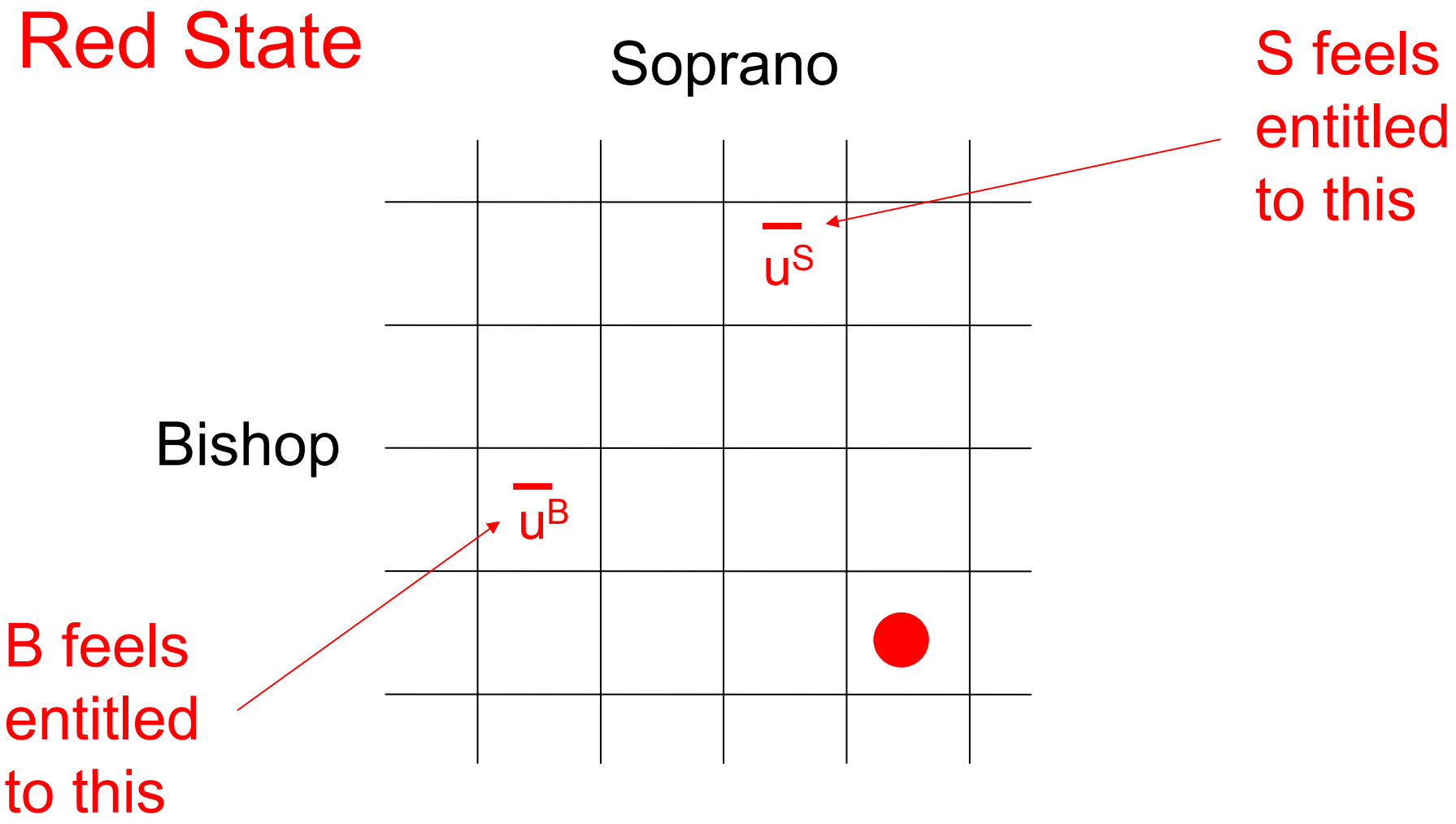
Role of contract:

to limit parties' feelings of entitlement



Role of contract:

to limit parties' feelings of entitlement



=> loss in Red State equals

$$\text{Loss} = \underbrace{\theta\{\bar{u}^S - u^S\}}_{\text{loss imposed on B by S's shading}} + \underbrace{\theta\{\bar{u}^B - u^B\}}_{\text{loss imposed on S by B's shading}}$$

Bring this machinery to Bishop/Soprano model:

for small θ,

fixed price ($p = p$)
Bishop chooses music

is the unique optimal contract

employment contract!

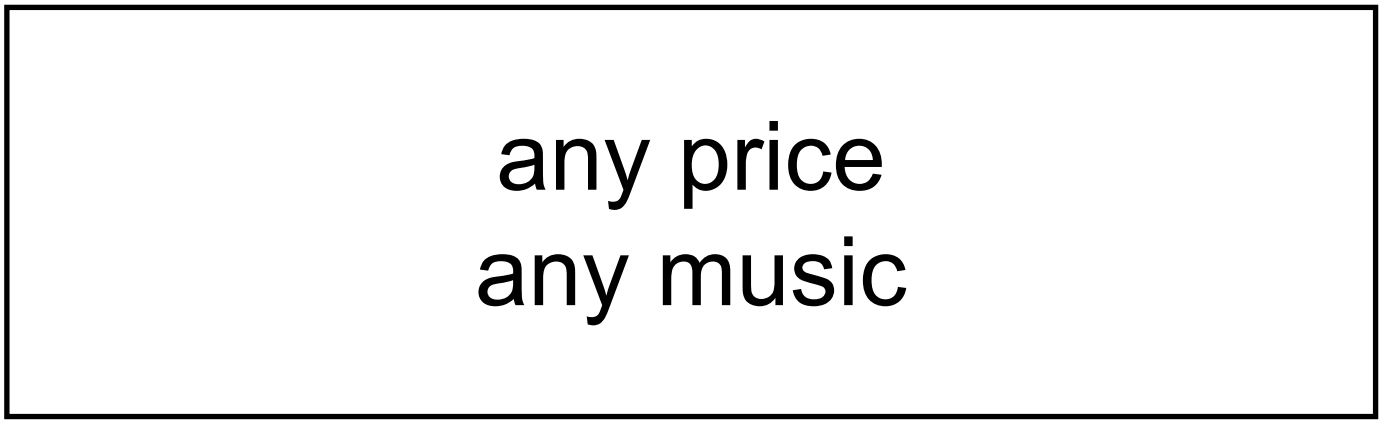
for large enough θ,

fixed price ($p = p$)
fixed music (e.g. Mozart)

is the optimal

(in this case, more is less)

What is never optimal is “No Contract”:



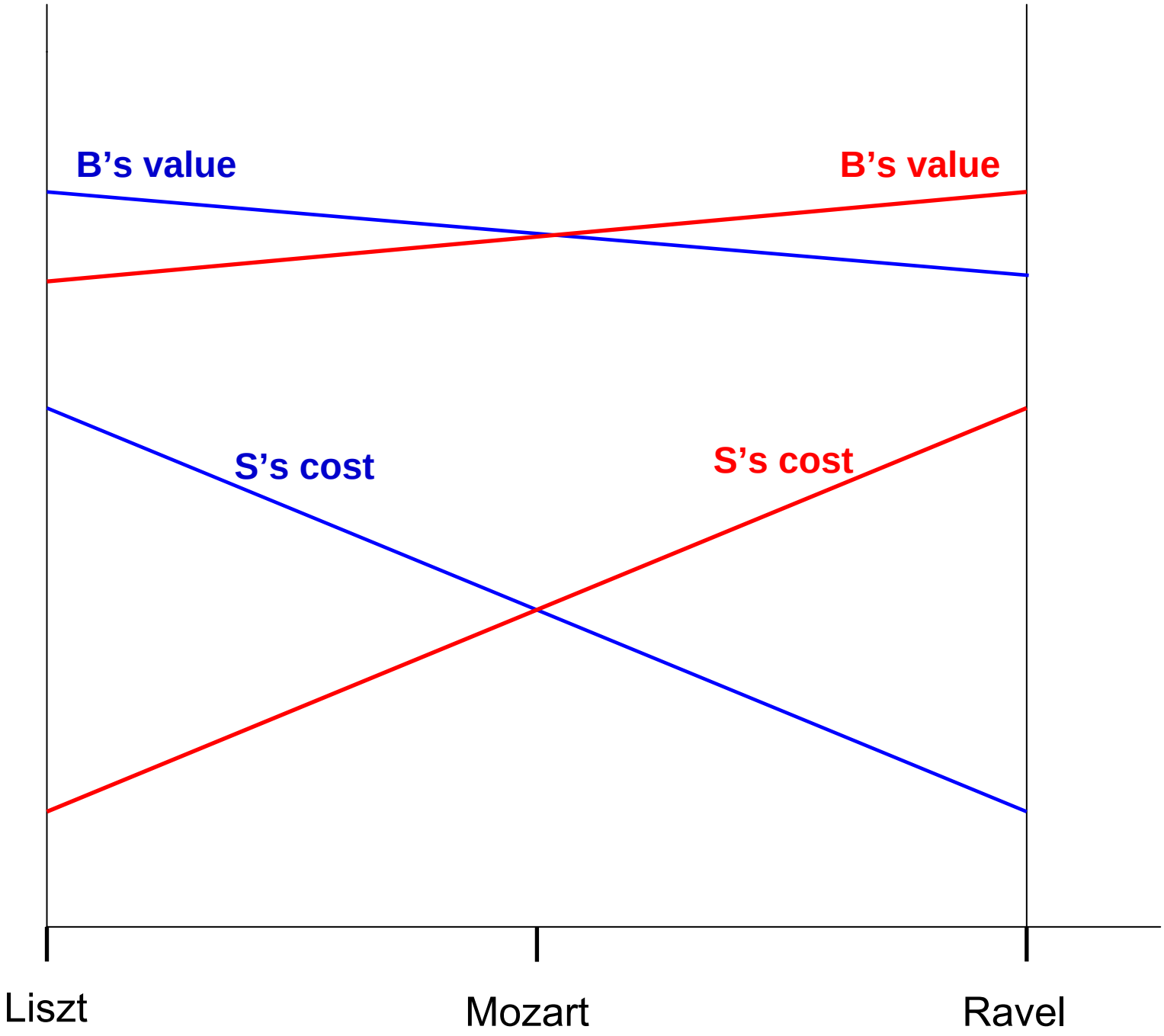
If price is not fixed at date 0, then at date 1 B and S will fight over money (as well as music):

for every M euros fought over,
there will be a (combined) loss of θM

Also not optimal is “sub-contracting”:

fixed price (p = p)
Soprano chooses music

sub-contracting would be optimal if the Soprano had more at stake than the Bishop:


B's value
B's value
S's cost
S's cost
Liszt
Mozart
Ravel

Advantages of the machinery in PAPER 2, relative to PAPER 1:

- restores a role for mechanisms which we see in practice

  e.g. employment contracts

- distribution of surplus is unimportant

  e.g. no need for specific investment

  => analysis is simpler

Arguably, disadvantage of PAPER 2, relative to PAPER 1:

- relies on speculative psychological assumptions

  (θ is an unmodelled free parameter)

But perhaps this is an advantage?

THE END