

A method to calculate  
a forestry sector's inflation in Brazil:  
impacts in a discounted cash flow of an investment analysis



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## Hypothesis:

there is a significant difference between considering Brazilian general inflation and regional sectoral inflation in a long-term wood supply contract.

And it is not difficult to get it ...

# A method to calculate a forestry sector's inflation in Brazil:

impacts in a discounted cash flow of an investment analysis

*Context: Brazilian Inflation & Forestry (1)*

*About region & existing data (2)*

*Methodology (3)*

*Results: Cost Inflation & Wood Prices (4)*

*Impacts in a DCF (5)*

*Conclusions (6)*

## (1) Context: *Brazilian Inflation & Forestry*

### Quick review

Brazilian population	191 Millions of inhabitants
Total area	851 Million ha
Forest Area	518 Million ha (67%)
Natural Forests	510 Million ha
Planted Forests (Eucalyptus, Pinus, Teak)	8 Million ha
July general Inflation	0,67%
Last Year	6.41%
Last 12 months	9.56%

## (1) Context: *Brazilian Inflation & Forestry*

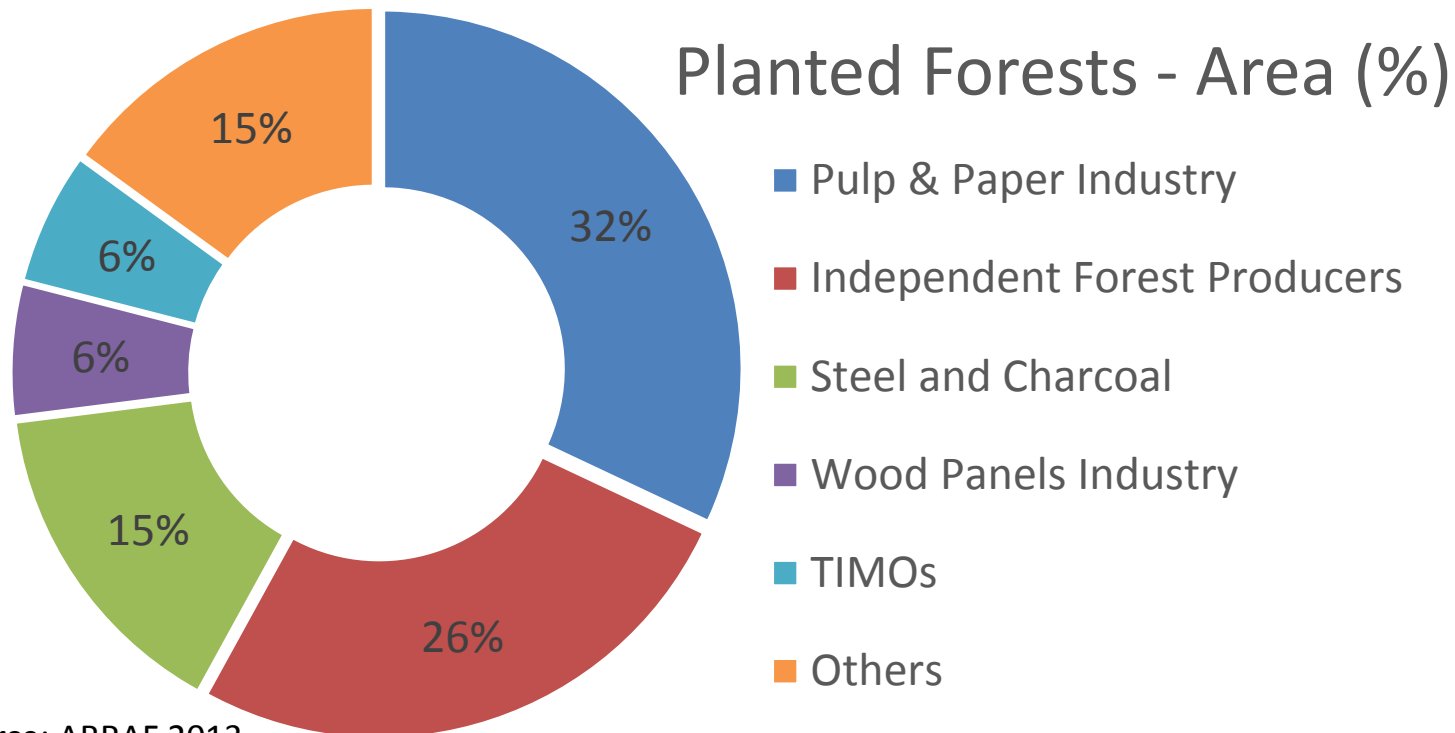
AUMENTO DO CUSTO DE PRODUÇÃO DA MADEIRA VERSUS INFLAÇÃO BRASILEIRA (IPCA)  
INCREASE IN THE COST OF WOOD PRODUCTION VERSUS BRAZILIAN INFLATION (IPCA)



FONTE: PÖYRY (2014) / SOURCE: PÖYRY (2014)

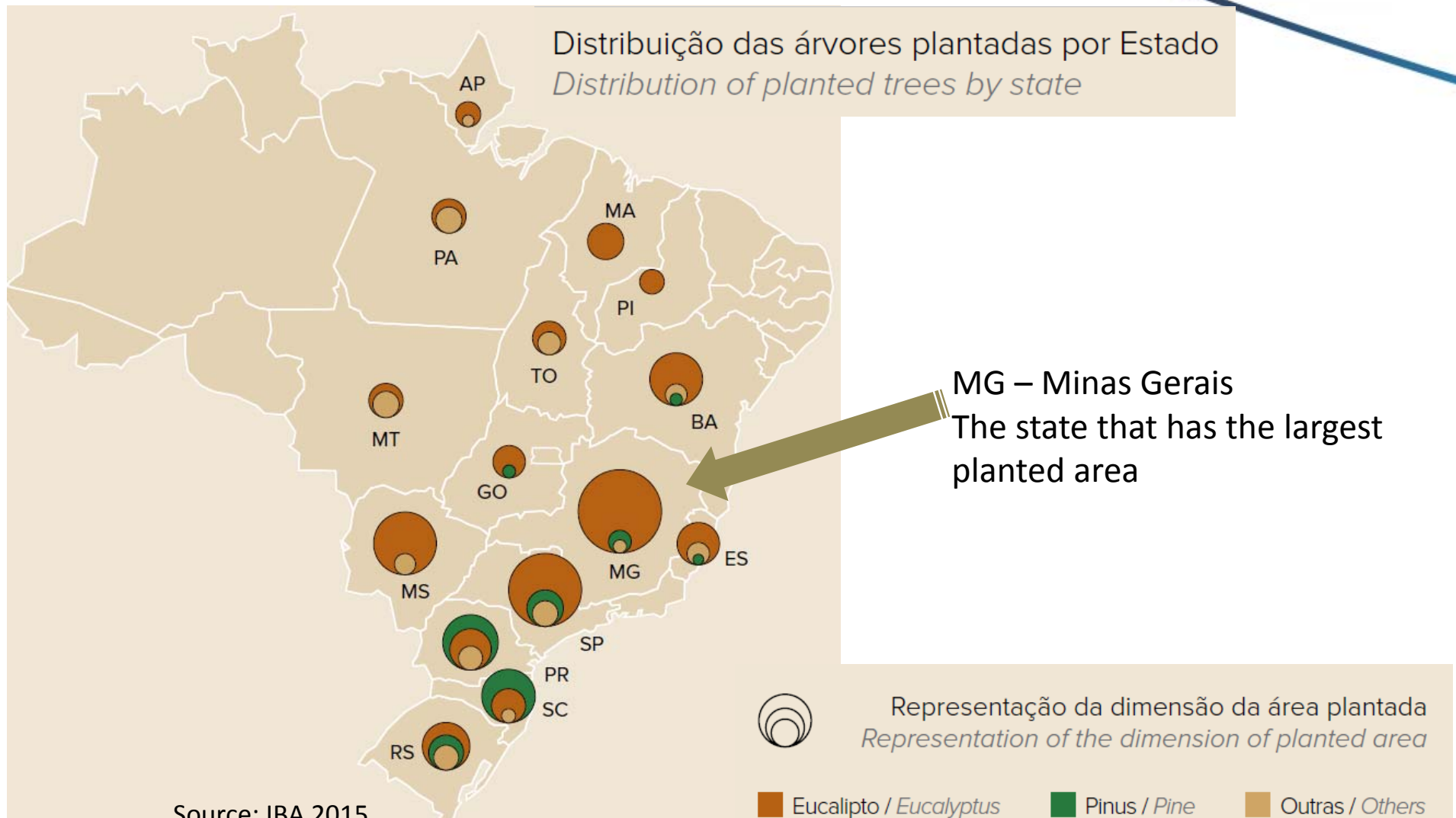
IPCA: Brazilian general inflation to consumers calculated by IBGE – Brazilian Institute of Statistics  
INCAF: Brazilian forest sector inflation calculated by Poyry

## (1) Context: *Brazilian Inflation & Forestry*



Independent Producers + TIMOs + Others  $\approx$  50%

## (2) About region & Existing data



## (2) About region & Existing data

Estado <i>State</i>	Área plantada com árvores (ha) <i>Area of planted trees (ha)</i>			
	Eucalipto <i>Eucalyptus</i>	Pinus <i>Pine</i>	Outras <i>Others</i>	Total <i>Total</i>
MG	1.400.232	39.674	5.313	1.445.219
SP	976.186	123.996	90.147	1.190.329
PR	224.089	673.769	16.255	914.113
MS	803.699	7.135	23.000	833.834

MG – A new area in the north of the state  
The need of long-term contracts



Agriannual: Statistical Yearbook  
of Brazilian agriculture

The most traditional yearbook we  
have on agriculture data





## (3) Methodology

Laspeyres index

the same methodology that IBGE uses to calculate IPCA

$$ILp = \frac{\sum P_n \times Q_0}{\sum P_0 \times Q_0} \times 100\%$$

Inflation of a package of products balanced by the amount of each products is used in the package

Where:

$P_n$  – Prices in a year n

$P_0$  – Prices in year 0

$Q_0$  – Quantities in year 0

$Q_0$  – represents a current silvicultural technology in an specific region.

Data from 2004 to 2013

## (3) Methodology

1 – Select relevant and current forest operations and inputs

*In our analysis, we selected according to the data we had in Agriannual*

2 – Create a table of “what we consume in this current technology”

3 – Collect prices of each operations and inputs over the years

*We used 10 years of Agriannual data, from 2004 to 2013*

4 – Agree on concept of “prices”: like where, what precisely is, when

5 – Multiply and have a series of expenses

## (3) Methodology

Order	Silvicultural operations and inputs	P <sub>0</sub> (R\$)	Unit	Q <sub>0</sub> (per ha)	P <sub>0</sub> *Q <sub>0</sub>
1	Liming / Liming and Phosphating	32.16	MH	1.00	32.16
2	Subsoiling	58.95	MH	1.00	58.95
3	Mowing in between line	28.90	MH	5.20	150.28
4	Herbicide application	39.93	MH	11.50	459.20
5	Firebreaks maintenance and carriers	28.90	MH	3.90	112.71
6	Ants control	27.00	MD	4.50	121.50
7	Weeding	27.00	MD	12.00	324.00
8	Broadcast fertilization	27.00	MH	5.50	148.50
9	Pruning	27.00	MD	3.00	81.00
10	Ants control (3 times)	27.00	MD	26.00	702.00
11	Fertilizers	516.14	Ton	1.81	934.21
12	Herbicides	17.00	Kg	33.50	569.50
13	Inceticides (for ants)	7.90	Kg	30.00	237.00
14	Plants	220.31	thousand	1.74	383.34
15	Technical Assistance	78.40	H	8.00	627.20
				Σ (P <sub>0</sub> *Q <sub>0</sub> )	5.941,56

MH – machine-hour; MD man-day; H Consulting-hour

## (3) Methodology

Collect prices over the years ...

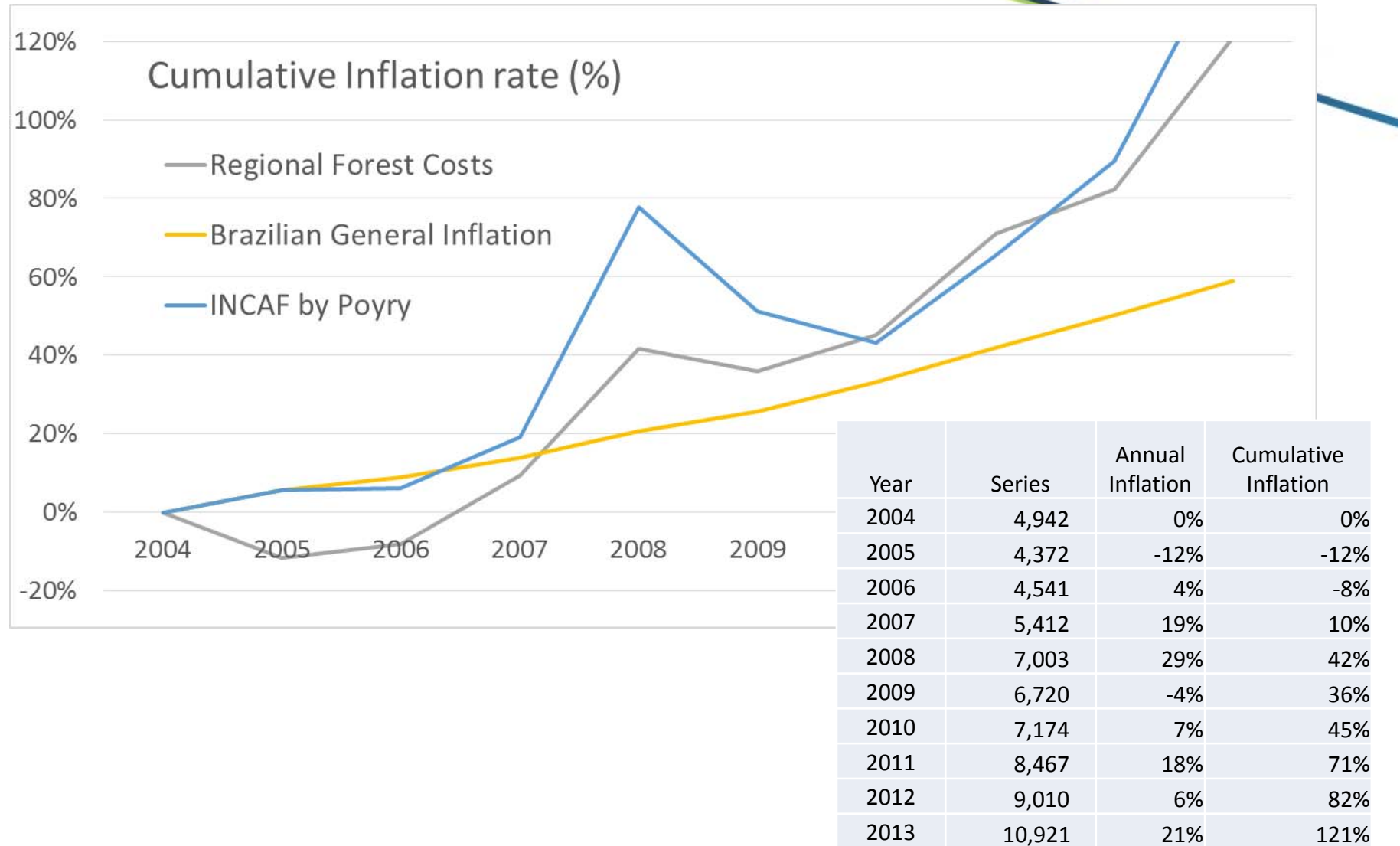
Order	Silvicultural operations and inputs	P2005	P2006	P2007	P2008	P2009	P2010	P2011	P2012	P2013
1	Liming / Liming and Phosphating	37.28	37.50	39.35	54.62	53.42	49.73	51.80	46.85	65.68
2	Subsoiling	56.34	54.55	57.00	87.38	77.29	69.05	75.95	72.34	132.30
3	Mowing in between line	31.95	32.90	35.32	47.59	52.60	42.33	53.21	44.44	61.59
4	Herbicide application	45.49	42.90	46.11	87.03	93.93	60.29	81.81	107.85	134.29
5	Firebreaks maintenance and carriers	31.95	32.90	35.32	47.59	52.60	42.33	53.21	44.44	61.59
6	Ants control	18.00	25.00	26.00	29.00	32.40	45.00	48.09	51.36	55.98
7	Weeding	18.00	25.00	26.00	29.00	32.40	38.00	40.61	43.37	47.27
8	Broadcast fertilization	18.00	25.00	26.00	29.00	32.40	38.00	40.61	43.37	47.27
9	Pruning	18.00	25.00	26.00	29.00	32.40	45.00	48.09	48.09	52.42
10	Ants control (3 times)	18.00	25.00	26.00	29.00	32.40	38.00	40.61	43.37	47.27
11	Fertilizers	392.00	382.10	482.00	771.00	591.40	736.77	1,135.00	1,280.00	1,280.00
12	Herbicides	16.62	10.00	18.00	21.04	16.21	19.00	15.61	15.50	47.53
13	Insecticides (for ants)	7.53	6.25	5.00	8.00	8.50	10.00	13.83	13.50	13.00
14	Plants	220.00	220.00	380.00	390.00	270.00	330.00	330.00	300.00	350.00
15	Technical Assistance	84.00	98.00	106.40	116.20	130.00	142.80	152.60	152.60	155.60

## (3) Methodology

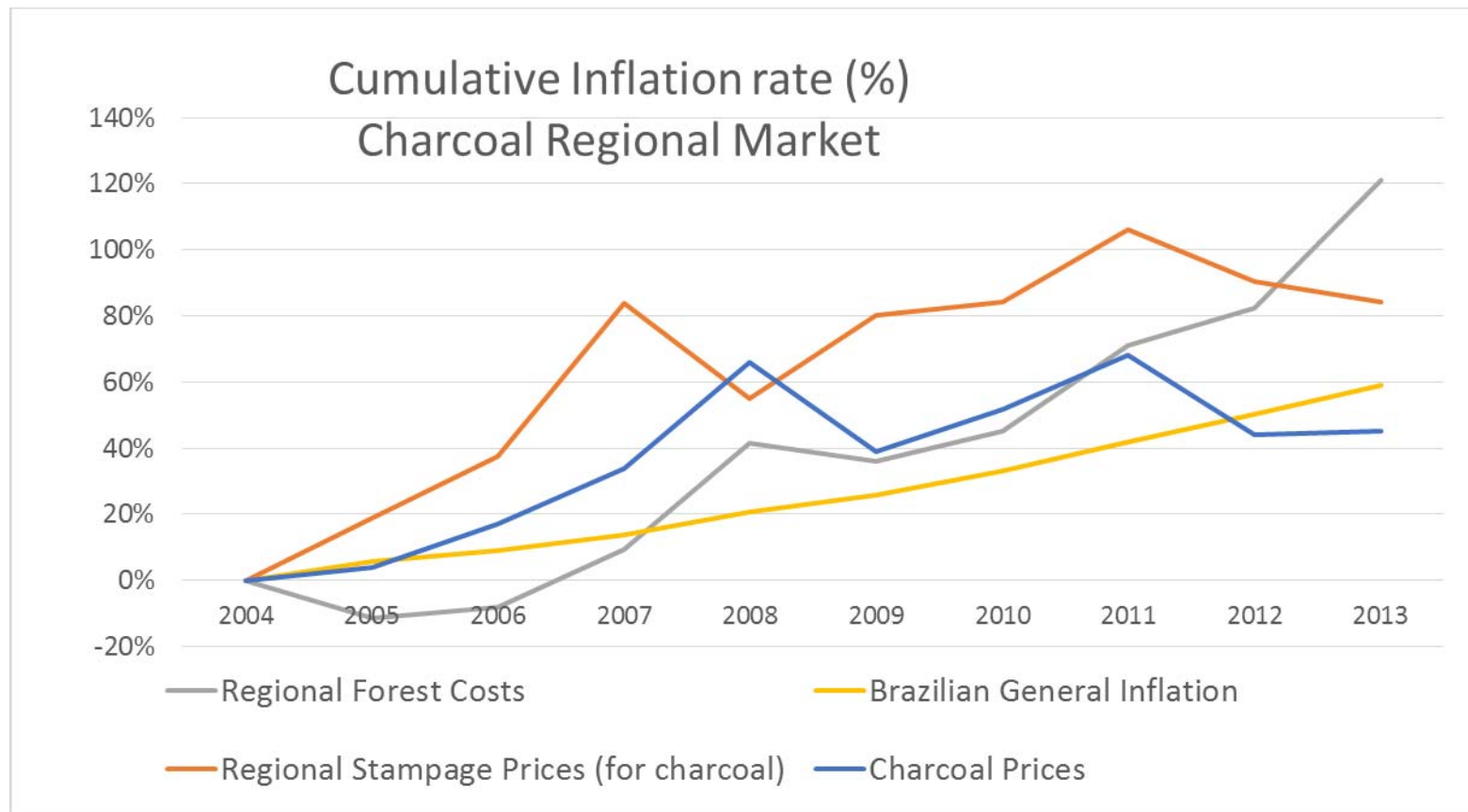
Multiply per  $Q_0...$

Order	Silvicultural operations and inputs	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	Liming / Liming and Phosphating	32.16	37.28	37.50	39.35	54.62	53.42	49.73	51.80	46.85	65.68
2	Subsoiling	58.95	56.34	54.55	57.00	87.38	77.29	69.05	75.95	72.34	132.30
3	Mowing in between line	150.28	166.14	171.08	183.66	247.47	273.52	220.12	276.69	231.09	320.27
4	Herbicide application	459.20	523.14	493.35	530.27	1,000.85	1,080.20	693.34	940.82	1,240.28	1,544.34
5	Firebreaks maintenance and carriers	112.71	124.61	128.31	137.75	185.60	205.14	165.09	207.52	173.32	240.20
6	Ants control	121.50	81.00	112.50	117.00	130.50	145.80	202.50	216.41	231.12	251.91
7	Weeding	324.00	216.00	300.00	312.00	348.00	388.80	456.00	487.32	520.44	567.24
8	Broadcast fertilization	148.50	99.00	137.50	143.00	159.50	178.20	209.00	223.36	238.54	259.99
9	Pruning	81.00	54.00	75.00	78.00	87.00	97.20	135.00	144.27	144.27	157.26
10	Ants control (3 times)	702.00	468.00	650.00	676.00	754.00	842.40	988.00	1,055.86	1,127.62	1,229.02
11	Fertilizers	934.21	709.52	691.60	872.42	1,395.51	1,070.43	1,333.55	2,054.35	2,316.80	2,316.80
12	Herbicides	569.50	556.77	335.00	603.00	704.84	543.04	636.50	522.94	519.25	1,592.26
13	Insecticides (for ants)	237.00	225.90	187.50	150.00	240.00	255.00	300.00	414.90	405.00	390.00
14	Plants	383.34	382.80	382.80	661.20	678.60	469.80	574.20	574.20	522.00	609.00
15	Technical Assistance	627.20	672.00	784.00	851.20	929.60	1,040.00	1,142.40	1,220.80	1,220.80	1,244.80
		4,941.55	4,372.49	4,540.69	5,411.85	7,003.46	6,720.23	7,174.47	8,467.17	9,009.70	10,921.05

## (4) Results

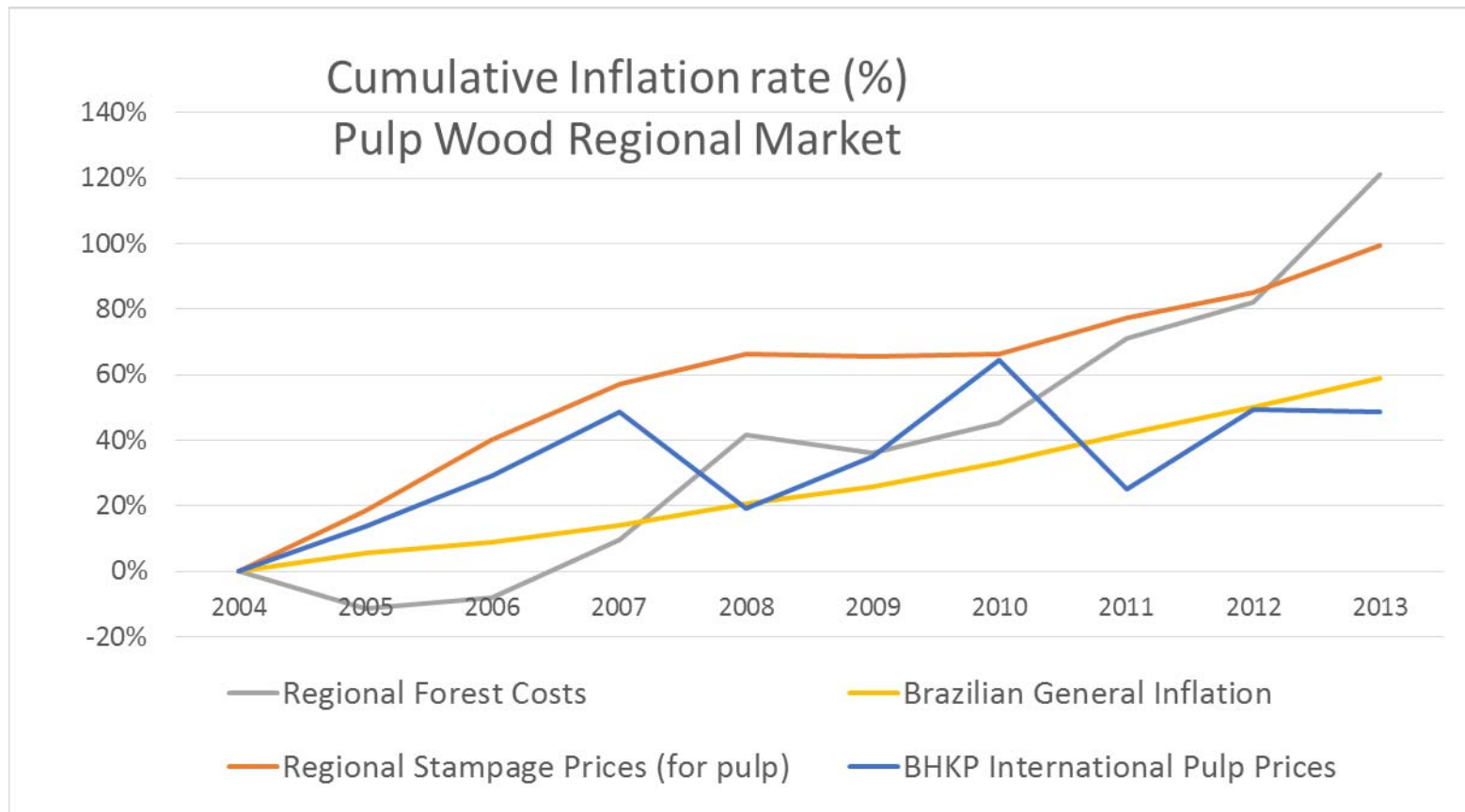


## (4) Results: *Cost Inflation & Wood Prices*



Source: IBGE and Atrium

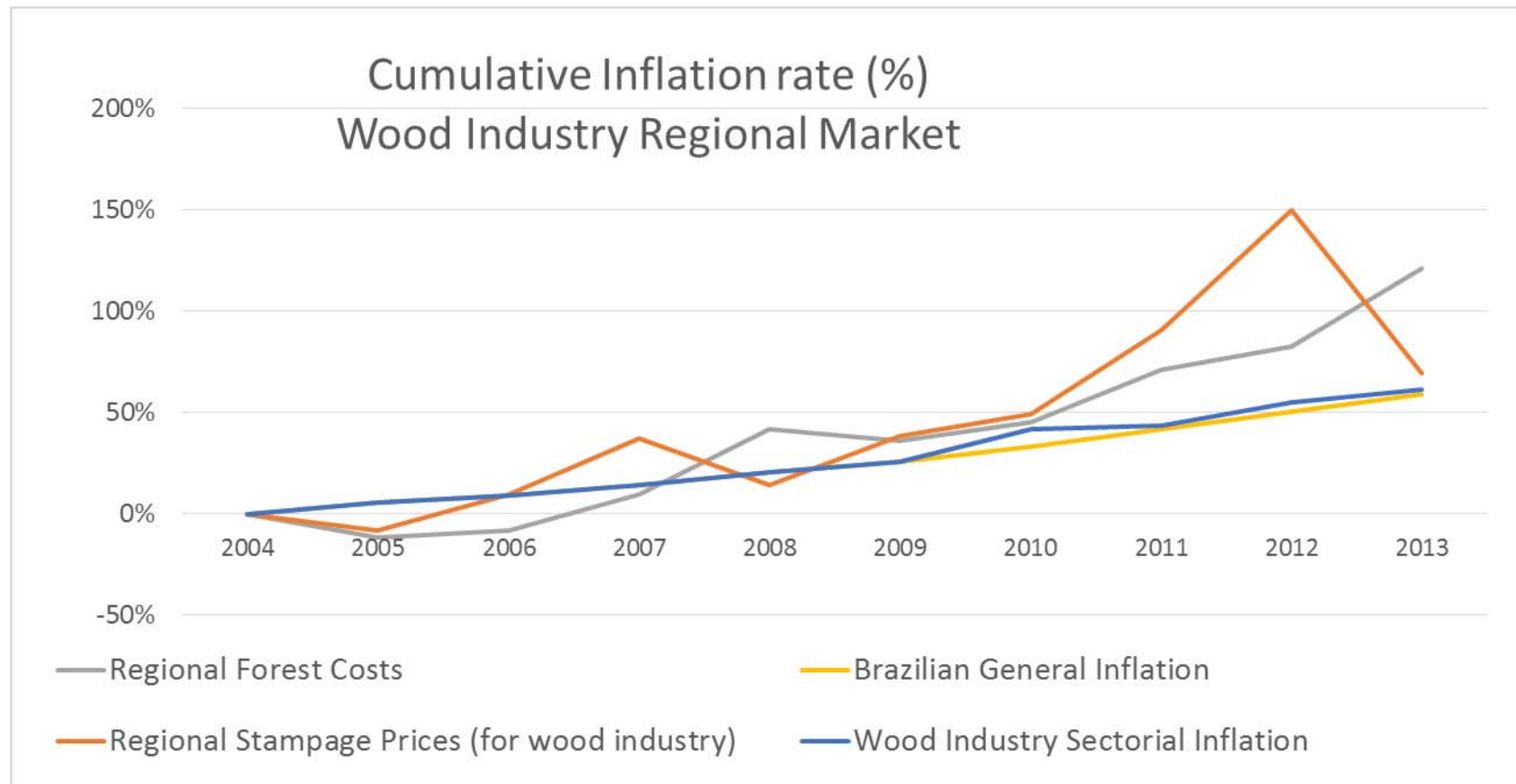
## (4) Results: *Cost Inflation & Wood Prices*



Source: IBGE and Atrium



## (4) Results: *Cost Inflation & Wood Prices*



Source: IBGE and Atrium

## (4) Impacts in a Discounted Cash Flow

Minas Gerais Project calculated in 2013		
Investment	162	R\$ millions
+ funding	65	R\$ millions
Funding Interest rate	7.25%	Government Funding for forest plantations
Planted Area	22000	ha
Eucalyptus rotation	6	Years
Horizon	26	Years (4 rotations)
Land Appreciation	3%	Regional average (above inflation)
Working Capital	7%	Basic Interest rate
Inflation for costs	6%	IPCA forecast
Inflation for stumpage prices	6%	IPCA forecast
TIR	11.1%	

## (4) Impacts in a Discounted Cash Flow

Costs Inflation	Prices Correction	Contract	IRR
6%	6%	IPCA	11.10%
8%	6%	IPCA	9.70%
8%	5%	IBGE Prices	8.30%
8%	8%	Forest Costs	11.50%

Project's return depends on:  
contract, forest growth and future economy

Safe option: If prices could vary like costs

## Conclusion

1. *We accept the initial hypothesis*
2. *We should consider sectoral inflation in our long-term contracts of wood supply.*
3. *It is not that difficult to calculate*
4. *We have to agree on terms of calculations; it should be in the contract*
5. *It would be better if we have contracts based on set of indexes.*

***Thanks***

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