WHERE IS IT BETTER TO INVEST IN BUYING FARM LAND, IN ARGENTINA OR IN THE US?[1]

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SUMMARY

This paper analyzes where would be better to invest buying farm land: in the best part of the American Corn Belt or in the Argentinean one. The analysis is based in the Net Present Value methodology. The results show that there is no significant difference between both situations. The differences are in the land market prices: in the US prices are close to 3 times the Net Present Value, and in Argentina prices are close to 2 times the Net Present Value. Both models are only sensible to differences in prices of grains

Key words. Net Present Value, land price, input prices, sensitivity analysis.

¿DONDE ES MEJOR INVERTIR EN LA COMPRA DE CAMPO EN ARGENTINA O EN ESTADOS UNIDOS?

RESUMEN

Este trabajo analiza dónde sería mejor invertir en la compra de un campo agrícola: en el cinturón maicero norteamericano o en la Pampa Húmeda en Argentina. El análisis se basa en la aplicación de la metodología del Valor Neto Presente. Los resultados muestran que no hay diferencias significativas entre ambas situaciones. Las diferencias se encuentran en los precios del mercado de campos: en los Estados Unidos los precios de mercado son cerca de 3 veces el Valor Neto Presente, y en Argentina los precios de mercado están cerca de 2 veces el Valor Neto Presente. Ambos modelos son solamente sensibles a diferencias en los precios de los granos.

Palabras clave. Valor Neto Presente, precios de la tierra, precios de insumos, análisis de sensibilidad

INTRODUCTION

The idea of this paper is to analyze where is it better to invest in buying land for a typical agricultural production. In the US or in Argentina?

To make this comparison we are going to analyze two hypothetical operations. One in the best part of the Indiana production area, that could be a good example of the American corn belt, and the other one in the Northeast region of Buenos Aires province, representative of one of the best production areas in the Argentine corn belt.

The assumption is that this analysis is made for an American investor, who is already farming in Indiana.

MATERIALS AND METHODOLOGY

We will use historical data for yields, prices and production costs in both countries. Several assumptions will be made in order to simulate both operations. The source of information will be cited in each of the assumptions. The methodology is based in the Net Present Value approach, for a projected period of 25 years.

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ANALYSIS AND DISCUSSION

American Situation

For the ***American situation*** (Table 1) we considered the following assumptions:

Assumption 1: **Cost of Capital**

The investor's cost of capital (COC) will be:

Expected long term debt (Wd): 33%

Expected long term equity (We): 67%

Expected ROE (Return on Equity) (ke): 18%

Average interest rate on debt (kd): 9%

Tax bracket (t): 35%

d = ke * We + kd * (1-t) * Wd
d = (0.18 * 0.67) + (0.09 * 0.65 * 0.33)
d = 14 %

Assumption 2: **Property taxes**

We are considering that property taxes will be $10.10/acre, which is the tax paid for a good acre of tillable land in Carroll County, West Central Indiana. The source of this information is the Carroll County Assessor's Office, and property taxes are not assumed to increase or decrease in the period under analysis, because we cannot predict with any certainty this type of information.

Assumption 3: **Production**

The proposed production will be a rotation of corn and soybeans, using no-till technology, available to the farmer.

Assumption 4: **Yields**

The based yields for corn and soybeans will come out of historical information for Carroll County, in the North Central region of Indiana. The source of this information is the Indiana Agricultural Statistics Service.

Since we are considering a top farmer, based yields will be the average of the last ten years plus one standard deviation from the mean.

For corn the average of the last 10 years is 142.6 bushels per acre, with a standard deviation from the mean of 17.48 bushels per acre. The corn-based yield will be 160.08 bushels/acre.

For soybeans the average of the last 10 years is 48.04 bushels per acre, with a standard deviation from the mean of 4.29 bushels per acre. The soybeans-based yield will be 52.33 bushels per acre.

For the increase in yields over the years the calculation was made in the following way. From historical information, based on the data provided by the Indiana Agricultural Statistics Service the bushels average increase of a series of 20 years for corn is 2 bushels per year, and for soybeans is 0.7 bushels per year.

Assumption 5: **Prices**

Prices for corn and soybeans were calculated as the average of the last 26 years, from the Indiana Agricultural Statistics Service information. Those averages are: $ 2.47/bushel for corn and $ 6.09/bushel for soybeans.

We did not increase or decrease prices, because they have not had a tendency to increase or decrease steadily over time in the market. Of course, there are variations over the years, but the average is the best measure for prices. A sensitivity analysis was conducted in order to show the impact of variations in prices. This same consideration will be applied to the Argentinean situation.

Assumption 6: **Expenses**

Variable costs: values of variable costs come from the 1999 Purdue Crop Guide. Figures are in $/acre:

	CORN	BEANS
Fertilizer	46	21
Seed	26	21
Chemicals	33	12
Dryer fuel	12	0
Fuel (0.80 $/gallon)	9	9
Repairs	10	10
Hauling	10	3
Interests	8	8
Insurance/misc.	13	10
Total	167	92

Fixed costs: values of fixed costs come from the 1999 Purdue Crop Guide, for a rotation of corn and soybeans in a 1000 acres operation in a high yield soil. Figures are in $/acre:

	CORN	BEANS
Machinery	35.0	35.0
Drying/handling	8.1	4.0
Labor	10.0	8.0
Total	53.1	42.0

Assumption 7: **Increase in expenses**

The biggest assumption for this analysis is the rate at which costs are increasing over the years. Some costs are not increasing at the annual rate of inflation, for instance fuel and fertilizers, which fluctuate up and down with international markets rather than with domestic inflation. We will consider a rate of increase of 1.5 % per year, which is a conservative figure. As this assumption is very important in the economical performance of the business, a sensitivity analysis was conducted to analyze its impact.

Assumption 8: **Government payments**

They were considered for the first four years using the FSA yield and the corn base for a good acre of land in Carroll County, provided by the FSA officer at Delphi.

The percentage utilized are 35% for the first year, 32 % for the second, 26% for the third, and 25% for the forth. The formula applied for the calculation of these payments is from the 1999 Purdue Crop Guide.

Percentage * 0.85 * FSA yield * acres of corn base

Since we have no elements to know if this program of government payments will continue in the future, and it looks like unrealistic today to think that it will be totally removed, after the first four years, it was considered a government payment with a 20 percent rate.

So, how much can we pay for an acre of land in Carroll County, Indiana?

In order to get a price for an acre of land we will use the present value approach (Table 2). This is the calculation of the sum of the present value of the annual net cash flows (PVANCF) generated in that acre of land.

The calculation was made in the following way: for the first 25 years the annual net cash flows (ANCF) are:

CI + Government payments – (CE + Property taxes + Income taxes)

where CI are cash incomes and CE are cash expenses.

To have the PVANCF every ANCF is discounted using the discount rate, in this case 14%.

To calculate the PVANCF after the year 25 we used the "Warren Buffet methodology" of the residual value. From the "Purdue Land Value Survey" of September 1999, the percentage increase in land price for a top quality acre of land in the West Central district of Indiana is 0.20% per year for the last 22 years. Since this trend value change depending on how many years are considered in the period under analysis, a sensitivity analysis will be conducted.

Once we estimated the annual growth rate, we assumed that from year 26 on, the ANCF will grow at that percentage to perpetuity, generating a residual value, which was added to the sum of the first 25 PVANCF.

The estimated price for an acre of land in Indiana is: **$ 968.35/ acre**

Argentinean situation

For the ***Argentinean situation*** (Table 3) we will use the International Metric System of units (hectares (ha), tons, etc.), and dollars as currency (by law, since April 1991, 1 peso = 1 dollar), and will translate the final result to make it comparable with the one of the American situation. We considered the following assumptions:

Assumption 1: **Cost of Capital**

The assumption is that this analysis is made for an American investor, so the investor's cost of capital (COC) will be the same: 14%

Assumption 2: **Property taxes**

There are three property taxes for a good hectare of tillable land in Pergamino "County", Buenos Aires province. "Inmobiliario": 15.43 $/ha per year; "tasa por conservacion y mejora de la red vial municipal": 4.71 $/ha per year; "contribucion municipal especial para obras hidraulicas": 0.27 $/ha per year; giving a total of 20.41 $/ha per year.

Property taxes are not assumed to increase or decrease in the period under analysis, because we cannot predict with any certainty this type of information.

Assumption 3: **Production**

As well as in the American case, the proposed production will be a rotation of corn and soybeans, using no-till technology, available to the farmer.

Assumption 4: **Yields**

The based yields for corn and soybeans will come out of historical information for the North Region of Buenos Aires province. The source of this information is AACREA (Argentine Association of Regional Consortiums for Agricultural Experimentation), similar to Farm Business Farm Management Association in Illinois[1)].

For a top farmer based yields will be: 9,000 Kg/ha for corn and 3,500 Kg/ha for soybeans (average of the last 10years).

For the increase in yields over the years the calculation was made in the following way. From historical information, based on the data provided also by AACREA the kilograms average increase of a series of 20 years for corn is 200 Kg/year, and for soybeans is 60 Kg/year.

Assumption 5: **Prices**

Prices for corn and beans were calculated as the average of the last 18 years, from the Argentine Secretariat of Agriculture information. Those averages are $ 129.6/ MT for corn and $ 257.7/MT for

[1)] The authors could not use the official data published by the SAGPyA.

soybeans. These prices are based on delivery in Buenos Aires port. The percentage of discount due to commercialization expenses and transport from the farm are (average of the last 10 years): 30.85% for corn and 19.78% for soybeans; so the farm prices are $ 89.62/ MT for corn and $ 206.73 / MT for soybeans.

As well as in the American situation, we did not increase or decrease prices, because there are variations over the years, but the average is the best measure for prices. A sensitivity analysis was conducted in order to show the impact of variations in prices.

Assumption 6: **Expenses**

Variable costs: values of variable costs come from "Margenes Agropecuarios", a specialized magazine in agricultural management, March 1999 and from AACREA. Figures are in $/hectare:

	CORN	BEANS
Fertilizer	51.00	13.5
Seed	59.80	33.0
Chemicals	30.80	53.7
Custom farming	81.00	38.7
Harvest	68.57	52.0
Interests	9.00	6.0
Misc.	2.00	2.0
Total	302.17	198.9

Fixed costs: values of fixed costs come from the same sources of the variable costs. Figures are in $/ hectare, and are considered the same for both crops:

Vehicle	9.90
Labor (maintenance)	14.00
Administration/Tech service	24.00
Accounting service	6.00
Office exp.	9.60
Personal tax	1.00
Misc.	7.45
Total	**71.95**

Assumption 7: **Increase in expenses**

The biggest assumption for this analysis is the rate at which costs are increasing over the years. In Argentina the annual inflation rate is almost zero. Some costs are decreasing, for instance chemicals, that decrease 40% in the last 4 years, while labor increases by 30% in the same period. Fuel cost also increases, due to an increase in its tax rate. We will consider the same as in the American case, a rate of increase of 1.5% per year, which is a conservative figure. As this assumption is very important in the economical performance of the business, a sensitivity analysis will be conducted to analyze its impact.

Assumption 8: **Government payments**

They are no government payments in Argentina.

So, how much can we pay for a hectare of land in the North of Buenos Aires province, Argentina?

In order to get a price for a hectare of land we will use the present value approach (Table 4). This is the calculation of the sum of the present value of the annual net cash flows (PVANCF) generated in that hectare of land.

The calculation was made in the following way: for the first 25 years the annual net cash flows (ANCF) are:

CI – (CE + Property taxes + Income taxes)

where CI are cash incomes and CE are cash expenses.

To have the PVANCF every ANCF is discounted using the discount rate, in this case 14%.

To calculate the PVANCF after the year 25 we used the "Warren Buffet methodology" of the residual value. From "Margenes Agropecuarios" (3/99), the percentage increase in land price for a top quality hectare of land in the North Region of Buenos Aires province is 4.45 % per year for the last 22 years. Since this trend value change depending on how many years are considered in the period under analysis, a sensitivity analysis will be conducted.

Once we estimated the annual growth rate, we assumed that from year 26 on, the ANCF will grow at that percentage to perpetuity, generating a residual value, which was added to the sum of the first 25 PVANCF.

The estimated price for a hectare of land in Buenos Aires is: **$ 2,407.51 / ha**

This value is equivalent to $ 974.70 / acre

Sensitivity analysis

A sensitivity analysis was conducted for some assumptions to show what would happen to the land price in the case of differences between reality and the model. We conducted this sensitivity analysis for the following assumptions: *yield of corn, yield of soybean, price of corn, price of soybean, rate of increase of corn and soybeans, rate of increase in expenses, and percentage increase in land price (growth rate).*

With respect to *yield of corn, yield of soybean, price of corn, price of soybean and rate of increase of corn and soybeans,* we varied them by increments of 10% to a maximum increase or decrease of 40%. As a result, we got the different projected land prices that might occur if these variations do occur.

We conducted this sensitivity analysis for the American and Argentinean cases (Tables 5 and 6). In both, if the prices were to change even as little as 10% either way, the land price is affected a great deal. On Graph 1 we can see that the increase/decrease on the prices of corn and soybeans causes the greatest variation on the projected land price (A for USA and B for Argentina). This shows that the *land price is extremely sensitive to the price of the commodities.*

Variations in yields or rate of increase of yields do not affect the land price very much in either direction. The model is less sensible to these changes.

With respect to the rate of increase of expenses, we varied them from 1 to 4 % in both cases and the effect was very limited. The same happened in the case of increase in growth rate of land prices, that was between –3 % and 6 % in the American case and from 2.5 % to 7 % in the Argentine case.

CONCLUSIONS

Prices for land based on the methodology applied are not significantly different; $968.35 /acre in the American case and $974.70 /acre in the Argentine one.

This means that both top farmer operations will generate approximately the same Net Present Value.

The only difference among models is that we are considering Government Payments in the American case, and they do not exist in Argentina.

If we relax the assumption that Government Payments will continue after the forth year with a rate of 20%, the result for the American operation would be $930.85 /acre, a difference of only 4.5% with respect to the value for the Argentine operation.

Another conclusion is that land market prices are close to 3 times the Net Present Value for a top farmer operation in the US (around $ 3,000 /acre), and only close to 2 times in Argentina (around $4,500 - $ 5,000 /ha).

The sensitivity analysis shows that both models are sensible to variation in prices of corn and soybeans, and very little sensitive to variation in rate of increase in yields, expenses or growth rate.

Table 1: Annual Net Cash Flows (USA)

Year	Crop	Yield	Price	Govt. Payment	Cash Income	Cash Expenses	Property Tax	Income Tax	ANCF
1	corn	160,08	$2,47	$23,95	$419,35	$220,10	$10,10	$66,28	$122,87
2	beans	52,33	$6,09	$21,90	$340,59	$134,00	$10,10	$68,83	$127,66
3	corn	164,08	$2,47	$17,79	$423,07	$223,40	$10,10	$66,43	$123,15
4	beans	53,73	$6,09	$17,11	$344,33	$136,01	$10,10	$69,43	$128,78
5	corn	168,08	$2,47	$13,69	$428,85	$226,75	$10,10	$67,27	$124,73
6	beans	55,13	$6,09	$13,69	$349,43	$138,05	$10,10	$70,50	$130,78
7	corn	172,08	$2,47	$13,69	$438,73	$230,15	$10,10	$69,52	$128,95
8	beans	56,53	$6,09	$13,69	$357,96	$140,12	$10,10	$72,75	$134,99
9	corn	176,08	$2,47	$13,69	$448,61	$233,61	$10,10	$71,76	$133,14
10	beans	57,93	$6,09	$13,69	$366,48	$142,22	$10,10	$74,98	$139,18
11	corn	180,08	$2,47	$13,69	$458,49	$237,11	$10,10	$73,98	$146,24
12	beans	59,33	$6,09	$13,69	$375,01	$144,36	$10,10	$77,21	$148,79
13	corn	184,08	$2,47	$13,69	$468,37	$240,67	$10,10	$76,18	$150,49
14	beans	60,73	$6,09	$13,69	$383,53	$146,52	$10,10	$79,42	$153,02
15	corn	188,08	$2,47	$13,69	$478,25	$244,28	$10,10	$78,36	$154,72
16	beans	62,13	$6,09	$13,69	$392,06	$148,72	$10,10	$81,62	$157,22
17	corn	192,08	$2,47	$13,69	$488,13	$247,94	$10,10	$80,52	$158,91
18	beans	63,53	$6,09	$13,69	$400,59	$150,95	$10,10	$83,81	$161,41
19	corn	196,08	$2,47	$13,69	$498,01	$251,66	$10,10	$82,67	$163,06
20	beans	64,93	$6,09	$13,69	$409,11	$153,21	$10,10	$85,99	$165,58
21	corn	200,08	$2,47	$13,69	$507,89	$255,44	$10,10	$84,79	$167,19
22	beans	66,33	$6,09	$13,69	$417,64	$155,51	$10,10	$88,16	$169,73
23	corn	204,08	$2,47	$13,69	$517,77	$259,27	$10,10	$86,90	$171,28
24	beans	67,73	$6,09	$13,69	$426,16	$157,85	$10,10	$90,31	$173,85
25	corn	208,08	$2,47	$13,69	$527,65	$263,16	$10,10	$88,98	$175,33

Table 2: Present Value and Land Price

Year	ANCF	Discount Factor: 14.0%	PV ANCF
1	$122,87	0,8772203764	$ 107,79
2	$127,66	0,7695155887	$ 98,23
3	$123,15	0,6750347543	$ 83,13
4	$128,78	0,5921542412	$ 76,26
5	$124,73	0,5194497664	$ 64,79
6	$130,78	0,4556719195	$ 59,59
7	$128,95	0,3997246928	$ 51,54
8	$134,99	0,3506466454	$ 47,33
9	$133,14	0,3075943823	$ 40,95
10	$139,18	0,2698280598	$ 37,55
11	$146,24	0,2366986721	$ 34,61
12	$148,79	0,2076368983	$ 30,89
13	$150,49	0,1821433180	$ 27,41
14	$153,02	0,1597798300	$ 24,45
15	$154,72	0,1401621226	$ 21,69
16	$157,22	0,1229530699	$ 19,33
17	$158,91	0,1078569383	$ 17,14
18	$161,41	0,0946143040	$ 15,27
19	$163,06	0,0829975954	$ 13,53
20	$165,58	0,0728071818	$ 12,06
21	$167,19	0,0638679435	$ 10,68
22	$169,73	0,0560262614	$ 9,51
23	$171,28	0,0491473781	$ 8,42
24	$173,85	0,0431130815	$ 7,50
25	$175,33	0,0378196736	$ 6,63

TOTAL	$926,29
PV of residual	$42,06
TOTAL	**$968,35**

Residual Value	
Cash Flow year 25 *	$174,59
Growth Rate (g) (add)	0,20%
Cash Flow year 26	$174,94
Capitalization rate (k-g) (14.0-0.2)	13,80%
Value at end of year 26	$1.267,68
Discount factor	0,033176
PV of residual	**$42,06**

* average of years 24 and 25

Table 3: Annual Net Cash Flows (Argentina)

Year	Crop	Yield	Price	Govt. Paym.	Cash Income	Cash Expenses	Property Tax	Income Tax	ANCF
1	corn	9	$89,62	$0,00	$806,58	$374,12	$20,41	$144,31	$267,74
2	beans	3,5	$206,73	$0,00	$723,56	$270,85	$20,41	$151,36	$280,94
3	corn	9,4	$89,62	$0,00	$842,43	$379,73	$20,41	$154,83	$287,45
4	beans	3,62	$206,73	$0,00	$748,36	$274,91	$20,41	$158,58	$294,46
5	corn	9,8	$89,62	$0,00	$878,28	$385,43	$20,41	$165,33	$307,11
6	beans	3,74	$206,73	$0,00	$773,17	$279,04	$20,41	$165,77	$307,95
7	corn	10,2	$89,62	$0,00	$914,12	$391,21	$20,41	$175,79	$326,71
8	beans	3,86	$206,73	$0,00	$797,98	$283,22	$20,41	$172,95	$321,40
9	corn	10,6	$89,62	$0,00	$949,97	$397,08	$20,41	$186,22	$346,26
10	beans	3,98	$206,73	$0,00	$822,79	$287,47	$20,41	$180,11	$334,80
11	corn	11	$89,62	$0,00	$985,82	$403,03	$20,41	$196,63	$365,75
12	beans	4,1	$206,73	$0,00	$847,59	$291,78	$20,41	$187,24	$348,16
13	corn	11,4	$89,62	$0,00	$1.021,67	$409,08	$20,41	$207,00	$385,18
14	beans	4,22	$206,73	$0,00	$872,40	$296,16	$20,41	$194,35	$361,48
15	corn	11,8	$89,62	$0,00	$1.057,52	$415,22	$20,41	$217,34	$404,55
16	beans	4,34	$206,73	$0,00	$897,21	$300,60	$20,41	$201,43	$374,76
17	corn	12,2	$89,62	$0,00	$1.093,36	$421,44	$20,41	$227,64	$423,87
18	beans	4,46	$206,73	$0,00	$922,02	$305,11	$20,41	$208,50	$388,00
19	corn	12,6	$89,62	$0,00	$1.129,21	$427,77	$20,41	$237,92	$443,12
20	beans	4,58	$206,73	$0,00	$946,82	$309,69	$20,41	$215,54	$401,19
21	corn	13	$89,62	$0,00	$1.165,06	$434,18	$20,41	$248,16	$462,31
22	beans	4,7	$206,73	$0,00	$971,63	$314,33	$20,41	$222,56	$414,33
23	corn	13,4	$89,62	$0,00	$1.200,91	$440,69	$20,41	$258,37	$481,43
24	beans	4,82	$206,73	$0,00	$996,44	$319,05	$20,41	$229,55	$427,43
25	corn	13,8	$89,62	$0,00	$1.236,76	$447,30	$20,41	$268,54	$500,50

Table 4: Present Value and Land Price (Argentina)

Year	ANCF	Discount Factor:14.0%	PV ANCF
1	$ 267,74	0,8772203764	$ 234,87
2	$ 280,94	0,7695155887	$ 216,19
3	$ 287,45	0,6750347543	$ 194,04
4	$ 294,46	0,5921542412	$ 174,37
5	$ 307,11	0,5194497664	$ 159,53
6	$ 307,95	0,4556719195	$ 140,32
7	$ 326,71	0,3997246928	$ 130,60
8	$ 321,40	0,3506466454	$ 112,70
9	$ 346,26	0,3075943823	$ 106,51
10	$ 334,80	0,2698280598	$ 90,34
11	$ 365,75	0,2366986721	$ 90,17
12	$ 348,16	0,2076368983	$ 74,58
13	$ 385,18	0,1821433180	$ 72,97
14	$ 361,48	0,1597798300	$ 59,54
15	$ 404,55	0,1401621226	$ 58,90
16	$ 374,76	0,1229530699	$ 47,47
17	$ 423,87	0,1078569383	$ 47,43
18	$ 388,00	0,0946143040	$ 37,80
19	$ 443,12	0,0829975954	$ 38,12
20	$ 401,19	0,0728071818	$ 30,06
21	$ 462,31	0,0638679435	$ 30,57
22	$ 414,33	0,0560262614	$ 23,88
23	$ 481,43	0,0491473781	$ 24,48
24	$ 427,43	0,0431130815	$ 18,95
25	$ 500,50	0,0378196736	$ 19,57

TOTAL	$ 2.233,92
PV of residual	$ 173,59
TOTAL ($/ha)	$ 2.407,51
TOTAL ($/acre)	**$ 974,70**

Residual Value	
Cash Flow year 25 *	$ 478,41
Growth Rate (g) (add)	4,45%
Cash Flow year 26	$ 499,70
Capitalization rate (k-g) (14,0-4,45)	0,0955
Value at end of year 26	$ 5.232,44
Discount factor	0,0331762
PV of residual	**$173,59**

* average of years 24 and 25

Table 5: Sensitivity Analysis on Land Price (USA)

Percentage of change	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%
Yield for corn	96,048	112,05	128,06	144,07	160,08	176,09	192,1	208,1	224,11
Land price ($/acre)	576,49	674,41	772,39	870,37	968,35	1066,3	1164,3	1262,2	1360,2
variation	-391,86	-293,94	-195,96	-97,98	0	97,98	195,96	293,88	391,86
Yield for soybean	31,4	36,63	41,86	47,1	52,33	57,56	62,79	68,03	73,26
Land price ($/acre)	692,83	761,68	830,52	899,5	968,35	1037,2	1106	1175	1243,9
variation	-275,52	-206,67	-137,83	-68,85	0	68,84	137,69	206,66	275,51
Prices of corn	1,48	1,73	1,98	2,22	2,47	2,72	2,96	3,21	3,46
Land price ($/acre)	544,47	651,51	758,55	861,31	968,35	1075,4	1178,2	1285,2	1392,2
variation	-423,88	-316,84	-209,8	-107,04	0	107,04	209,8	316,84	423,88
Prices of soybeans	3,65	4,26	4,87	5,48	6,09	6,7	7,31	7,92	8,53
Land price ($/acre)	669,49	744,21	818,92	893,63	968,35	1043,1	1117,8	1192,5	1267,2
variation	-298,86	-224,14	-149,43	-74,72	0	74,71	149,42	224,14	298,85
Rate of increase of yield of corn (*)	2,4	2,8	3,2	3,6	4	4,4	4,8	5,2	5,6
Land price ($/acre)	937,2	944,98	952,77	960,56	968,35	976,13	983,92	991,71	999,5
variation	-31,15	-23,37	-15,58	-7,79	0	7,78	15,57	-1960,1	31,15
Rate of increase of yield of beans (*)	0,84	0,97	1,12	1,26	1,4	1,54	1,68	1,82	1,96
Land price ($/acre)	945,52	951,23	956,94	962,64	968,35	974,05	979,76	985,46	991,17
variation	-22,83	-17,12	-11,41	-5,71	0	5,7	11,41	17,11	22,82

Percentage of change	1%	1,50%	2%	2,50%	3%	3,50%	4%
rate of increase in expenses							
Land Price ($/acre)	977,37	968,35	959,19	949,91	940,48	930,91	921,2
variation	9,02	0	-9,16	-18,44	-27,87	-37,44	-47,15

Increase in growth rate of land price	-3%	-1%	-0,50%	0%	0,20%	1%	3%	5%	6%
Land Price ($/acre)	959,34	964,52	966,04	967,66	968,35	971,29	980,53	993,87	1003
variation	-9,01	-3,83	-2,31	-0,69	0	2,94	12,18	25,52	34,69

Table 6: Sensitivity Analysis on Land Price (Argentina)

Percentage of change	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%
Yield for corn (TM/ha)	5,4	6,3	7,2	8,1	9	9,9	10,8	11,7	12,6
Land price ($/acre)	645,87	728,08	810,28	892,49	974,7	1056,9	1139,1	1221,3	1303,5
variation	-328,83	-246,62	-164,42	-82,21	0	82,21	164,42	246,62	328,83
Yield for soybean (TM/ha)	2,1	2,45	2,8	3,15	3,5	3,85	4,2	4,55	4,9
Land price ($/acre)	716,77	781,25	845,73	910,22	974,7	1039,2	1103,7	1168,2	1232,6
variation	-257,93	-193,45	-128,97	-64,48	0	64,48	128,97	193,45	257,93
Prices of corn ($/TM)	53,77	62,73	71,7	80,66	89,62	98,59	107,54	116,51	125,47
Land price ($/acre)	597,32	691,64	786,06	880,38	974,7	1069,1	1163,3	1258,1	1352,1
variation	-377,38	-283,06	-188,64	-94,32	0	94,42	188,64	283,38	377,38
Prices of soybean ($/TM)	124,04	144,71	165,38	186,06	206,73	227,4	248,07	268,75	289,42
Land price ($/acre)	688,13	759,76	831,4	903,07	974,7	1046,3	1118	1189,6	1261,3
variation	-286,57	-214,94	-143,3	-71,63	0	71,63	143,27	214,93	286,57
Rate of increase of yield of corn (*)	0,24	0,28	0,32	0,36	0,4	0,44	0,48	0,52	0,58
Land price ($/acre)	926,17	938,3	950,44	962,57	974,7	986,83	998,96	1011,1	1029,3
variation	-48,53	-36,4	-24,26	-12,13	0	12,13	24,26	-1985,8	54,59
Rate of increase of yield of beans (*)	0,072	0,084	0,096	0,108	0,12	0,132	0,144	0,156	0,168
Land price ($/acre)	946,06	953,22	960,38	967,54	974,7	981,86	989,02	996,18	1003,3
variation	-28,64	-21,48	-14,32	-7,16	0	7,16	14,32	21,48	28,64

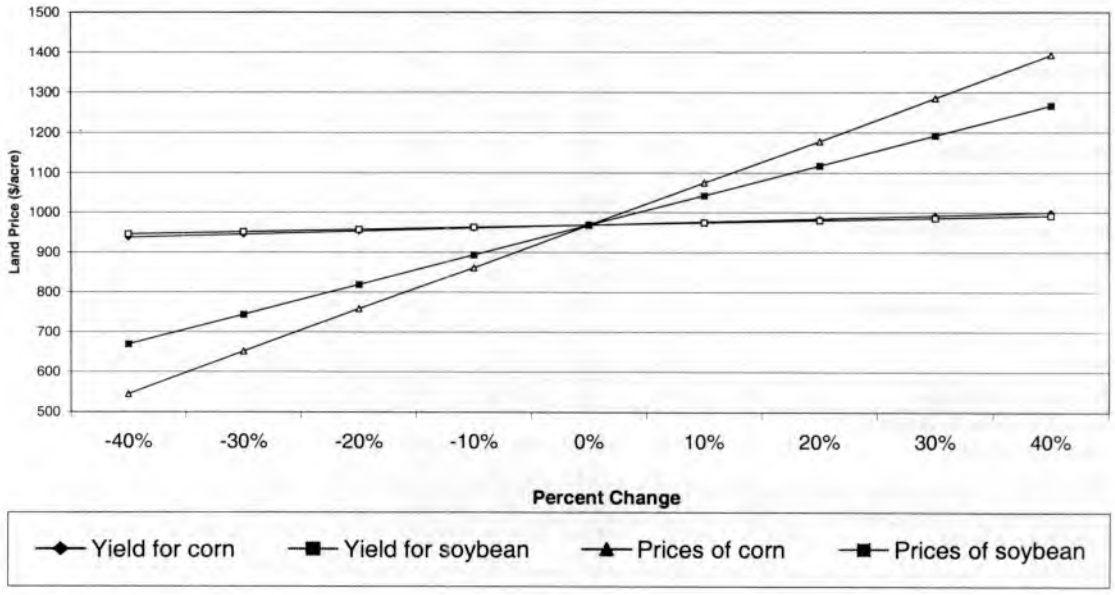
Percentage of change	1%	1,50%	2%	2,50%	3%	3,50%	4%
rate of increase in expenses							
Land Price ($/acre)	981,73	974,7	967,56	960,3	952,93	945,44	937,83
variation	7,03	0	-7,14	-14,4	-21,77	-29,26	-36,87

Increase in growth rate of land	2,50%	3%	3,50%	4%	4,45%	5,50%	6%	6,50%	7%
Land Price	961,69	964,59	967,76	971,25	974,7	984,18	989,56	995,67	1002,6
variation	-13,01	-10,11	-6,94	-3,45	0	9,48	14,86	20,97	27,94

(*) every 2 years, due to the crop rotation

Graph 1: Effects of sensitivity analysis on land prices

A: USA



B: Argentina