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Virtual Investment Concepts and the Ethanol Industry

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Abstract

The fast-growing US ethanol industry has historically been characterized by large downstream investments made by farmers. The authors assess the value which the stock market may hold for downstream investment by farmers as well as by ethanol manufacturers themselves. The model framework used herein expands on the original VEST framework developed by Siebert, Jones and Sporleder. A word of caution, the model herein is not intended to provide an on-going, risk-reducing business strategy. However, it can and does provide a quick method to calculate the reasonableness of a downstream investment request that a farmer (or any business person) might be challenged to consider. Although virtual stock market investments may certainly assist in value added performance, they (just like brick and mortar processing plants) can provide no guarantee of performance.

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Introduction

In their 1997 *Agribusiness, an International Journal*[2] article entitled, "The VEST Model: An Alternative Approach to Value Added," Siebert, Jones and Sporleder began with a relatively simple observation. Namely, when farmers take a further step to process the crop they are producing, these farmers are entering a new and different industry. The authors went on to argue that, with only a little imagination, publicly traded stocks could be used to take such a step in a virtual fashion as opposed to a physical one.

It is interesting to apply the VEST Model to the growth of the U.S. ethanol industry, a growth which has occurred in part due to direct investment by farmers via both cooperatives and limited liability companies. When one asks why such direct investment took place rather than virtual stock market investments, a number of possible reasons surface. These would include the following. First, the presence of state and local government subsidies to encourage new ethanol production as a means of needed local economic development. Second, few people within the US (outside of those in the rural Midwest) had sufficient familiarity with the ethanol industry to consider such investments. Third, until recently no pure-play, publicly-traded ethanol companies existed. No doubt many other reasons can also be suggested.

Today it is the case that several publicly traded firms have entered the ethanol industry and that recent capacity expansions have brought about new ethanol industry challenges. Within such a context we examine the applicability of the VEST model to this industry. We do so from both the perspective of a farmer considering integrating downstream (i.e., toward the consumer) into ethanol manufacturing as well as from the point of view of an ethanol plant manager regarding investment still farther downstream in the marketing chain. Although only exploratory, the contributions of this research pertain to both a better understanding of the farmer-investors' changed position in the marketing chain and also to what agribusiness managers might consider doing differently in regard to ethanol marketing and the stock market.

A word of caution, this model is not necessarily intended to provide an on-going, risk-reducing strategy. Instead it can be used to provide a timely look at the reasonableness of a downstream investment request that a farmer (or any business person) might be challenged to consider relative to their own pre-existing business. The Siebert, Jones and Sporleder model thus provides a timely yardstick. The examination of the model is likely to sharpen the business manager's (and

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[2] *Agribusiness, an International Journal* was published under the auspices of IAMA prior to 1998. At that time, IAMA ceased publishing that journal and began publishing *the International Food and Agribusiness Management Review*.

downstream investor's) understanding at a time when they are being asked to make a large investment. We find herein that on a per bushel basis ethanol plant stock market valuations are much less that that of ethanol plant construction costs. This may, in and of itself, convey an important cautionary message to would be bricks and mortar investors. Although virtual stock market investments may certainly assist in on-going value added performance, they (just like brick and mortar plants) provide no guarantee of future performance.

The Vest Model

With the VEST Model, Siebert, Jones and Sporleder made that case that farmers might do well to consider investments in publicly-held companies as an alternative to direct investment in their own further processing operations. The *vest equation* was initially suggested so that interested farmers could calculate how much stock to purchase so as to virtually process their crop and hence capture the added value. This topic, of relating a crop's production to the value added processing of that crop, has most certainly been a motivation for farmers building ethanol plants. For example, to explain the motivation of a corn farmer who was also a member of the Mid Missouri Energy cooperative member, Reinhart, Weber and Shelman state, "when corn prices were high, he made money on corn. When corn prices were low, he was potentially able to offset this with higher profits from the sale of ethanol" (p.1). An investment in the right publicly held company could do the same thing. The VEST equation shows the stock investment, in dollars, needed to achieve this as,

1) VEST = MKTCAP (FS / COGS)

where, MKTCAP stands for market capitalization, or the value of all shares outstanding. This is calculated as a public firm's individual stock share price multiplied by its number of shares of stock. FS denotes farm sales measured as the annual total sales of the farmer seeking a value added investment. Last, COGS is the public firm's annual cost of goods sold. Conceptually, the ratio FS / COGS gives a farmer's own crop sales dollars as a percentage of the public firm's total raw product input purchases. When this ratio is multiplied by MKTCAP, the result is the investment in shares (VEST) a farmer would need to make in order to virtually account for the processing volume of his/her farm's crop. From another perspective, the ratio of MKTCAP / COGS can be termed the VEST *coefficient*. When the VEST coefficient is multiplied by any size farm sales (FS), the result again is VEST. Note that the VEST model is intended to do much more than simply size a stock market investment in downstream processing to a farmer's output. It finds a mid-point between integrating downstream by means of the farmer building and running his/her own processing plant (or doing so via a co-operative or LLC) versus remaining as an independent producer with no downstream integration. Siebert, Jones, and Sporleder discuss this matter when they present a table comparing nine different characteristics of "farm raw commodities versus the finished product made from them" (p.562). VEST eliminates the classic marketing cooperative conflict between a member and his/her cooperative because the farmer now stands at arms length from any such relationship as far as the VEST investment goes.

Siebert, Jones and Sporleder calculated VEST coefficients for farmers in the red meat, poultry, and also grain sectors. They stated that such a manner of investing in value added enterprises offered the following advantages: "It does not require the hiring of new employees, the hiring of management, the purchase of facilities or equipment, the development of new products, the acquisition of new customers nor various other efforts. Apart from the stock price itself, it eliminates the costs associated with vertical integration. As a consequence the time required to manage a stock portfolio is much less than that needed to manage a bricks and mortar extension of the farm into value added or to participate in the governance of a cooperative" (p. 562-3). They admit to several limitations of VEST including an "insurmountable limitation" for farmers who produce a commodity which is not processed by any publicly traded investor owned firm (p.566). Of course, it must also be pointed out that when a farmer becomes his/her own customer, at least for the sales step from farmer to first handler, such a farmer gains substantially more control than is made available from a stock purchase.

The Case of the Farmer and the Ethanol Plant

One can compare the cost of constructing a new ethanol plant to the cost per bushel of investing in a publicly held ethanol firm. Exhibit 1 shows the *cost per bushel to construct* 23 different corn-based U.S. ethanol plants. These figures are from a wide variety of sources ranging from individual manufacturing plant's websites, to local newspapers, and more. The calculated average capital cost to build a plant (i.e., total capital outlay divided by annual bushel processing capacity) was $3.86/bu. This bricks and mortar investment figure of $3.86/bu. can be compared to the cost per bushel for a farmer to virtually invest in an ethanol plant via the VEST model. To do so, equation (1) can best be re-expressed on a simplified basis as,

2) $VEST_e$ = MKT CAP / Bushel Capacity

where $VEST_e$ is the cost of the processing capacity for a bushel of corn to be converted into ethanol, MKT CAP is a publicly-traded ethanol company's total number of shares outstanding times the market price of those shares of stock, and Bushel Capacity is the ethanol processing company's annual total corn input volume.

The companies to which we can apply equation (2) are Aventine Renewable Energy (AVR), MGP Ingredients (MGPI), Pacific Ethanol (PIEX), and VeraSun Energy (VSE). All four of these companies have the vast majority, or the entirety, of their assets devoted to ethanol processing. Exhibit 2 calculates $VEST_e$ over an eighteen month period dating back to July 2006. This is as far as one can go back as stock in both VeraSun and Pacific Ethanol only began trading in June 2006. $VEST_e$ ranges from a high of $2.11/bu. in July 2006 to a recent low of $0.73/bu. in December 2007.

Exhibit 1: Construction Cost per bushel for a Sample of Ethanol Plants [a]

Plant Name	Location	as of	Annual Capacity	Annual Capacity	Cost	Cost
			(Mil.Gal.)	*(Mil.Bu.)*	*(Mil. $)*	*($/Bu.)*
ACE Ethanol, LLC	WI	2004	41.0	15.0	$ 50.0	$ 3.33
Badger State Ethanol	WI	2002	47.0	14.8	$ 54.0	$ 3.65
Central Illinois Energy Coop	IL	2003	38.0	11.3	$ 90.0	$ 7.96
Commonwealth Agri-Energy LLC	KY	2004	20.0	8.0	$ 33.0	$ 4.13
Cornhusker Energy Lexington, LLC	NE	2004	40.0	15.0	$ 50.0	$ 3.33
Golden Grain Energy, LLC	IA	2003	40.0	15.0	$60.6	$4.04
Great Plains Ethanol, LLC	SD	2003	40.0	15.0	$52.0	$3.47
Husker Ag LLC	NE	2003	24.0	8.8	$29.4	$3.36
Iowa Ethanol, LLC	IA	2004	45.0	16.0	$60.0	$3.75
KAAPA Ethanol LLC	NE	2004	40.0	16.0	$53.0	$3.31
Lincolnland Agri-Energy	IL	2003	40.0	16.0	57.0	3.56
Little Sioux Corn Processors, LP	IA	2003	40.0	15.0	$52.0	$3.47
Mid Missouri Energy, LLC	MO	2004	40.0	15.0	$60.0	$4.00
Midwest Grain Processors	IA	2002	45.0	17.0	$57.0	$3.35
Northern Lights Ethanol, LLC	SD	2002	40.0	15.0	$50.0	$3.33
Otter Creek Ethanol, LLC	IA	2005	45.0	16.0	$60.0	$3.75
Pine Lake Corn Processors, LLC	IA	2005	22.0	7.0	$35.0	$5.00
Platte Valley Fuel Ethanol, LLC	NE	2003	40.0	15.0	$60.0	$4.00
Quad County Corn Processors	IA	2002	18.0	7.8	$20.0	$2.56
Sioux River Ethanol, LLC	SD	2005	45.0	15.5	$60.0	$3.87
Tall Corn Ethanol	IA	2003	40.0	15.0	$55.0	$3.67
United Wisconsin Grain Producers, LLC	WI	2005	40.0	15.0	$59.3	$3.96
Western Plains Energy, LLC	KS	2004	30.0	10.7	$41.1	$3.84
Averages			37.4	13.7	$ 52.1	$3.86

[a] Sample taken from various internet sources and other sources on January 25 and 26, 2007. A more detailed version of this table, with all web addresses and sources, is available from the authors upon request.

Exhibit 2: Weighted Average Estimated Market Capitalization per Bushel for Four Publicly Held Ethanol Manufacturers[a]

Date	Market Capital[b]	Market Capital per Bu.[c]	Change vs. Previous Month	Cumulative Change
	($000)	*($/Bu.)*	*(%)*	*(%)*
July '06	$5,518,903	$2.11		
Aug.	$4,670,160	$1.78	-15.64%	
Sept.	$4,444,078	$1.70	-4.49%	
Oct.	$3,271,866	$1.25	-26.47%	
Nov.	$3,552,117	$1.36	8.80%	
Dec.	$4,493,278	$1.72	26.47%	
Jan. '07	$3,821,893	$1.46	-15.12%	
Feb.	$3,378,992	$1.29	-11.64%	
Mar.	$3,207,555	$1.23	-4.65%	
Apr.	$3,600,249	$1.38	12.20%	
May	$3,531,162	$1.35	-2.17%	
June	$3,006,581	$1.15	-14.81%	
July	$2,888,817	$1.10	-4.35%	
Aug.	$2,817,211	$1.08	-1.82%	
Sep	$2,511,830	$0.96	-11.11%	
Oct.	$2,000,015	$0.76	-20.83%	
Nov.	$2,107,178	$0.80	5.26%	
Dec.	$1,903,216	$0.73	-8.75%	-65.40%

[a] Ethanol manufacturing firms included are Aventine, MGP, Pacific Ethanol, and VeraSun. Production capacity is estimated at the 2007 level of 2,618 billion bushels per year.
[b] Calculated as the sum of each individual firm's (stock price x shares outstanding) across each of the four different publicly traded ethanol manufacturers. Price in this calculation is the market close on the first trading day of the month from Thompson Financial.
[c] This is $VEST_e$ of equation (2). Processing capacity estimated at these firms' aggregate 2007 level of 2,618 million bushels of corn per year. (This means the decline in the value of market capital per bushel shown is an understatement as companies' bushel processing capacity would have been smaller in the earlier year 2006.)

These figures are all considerably below $3.86/bu. which was the average cost of construction from Exhibit 1. This would indicate that the stock market values ethanol production capacity at less than those who are building (or have built) ethanol plants. This fact should be a cautionary message to bricks and mortar investors. When compared to a direct investment, the VEST approach offers a cheaper way for a farmer to invest in ethanol manufacturing capacity.[3] However, it

[3] It must also be noted that, over the eighteen months presented, exhibit 2 shows ethanol stock market capitalization (defined as stock price x shares outstanding) to have declined by a cumulative 65.40%. Thus an ethanol stock purchase and re-sale over this time would have constituted a significant financial loss to the investor.

is uncertain as to whether the stock market investors or the other non-stock market investors will be correct as to their relative degree of bullishness in their investment.

Earnings from Farming and Ethanol Manufacturing

When a farmer invests in the bricks and mortar of an ethanol plant, the variety of combined earning outcomes rendered are presented in Exhibit 3. Running across the top of this table two abstractedly-simple alternatives are presented for farming net income, namely below normal and above normal.[4] Similarly, down the left side of this chart two equally simple alternatives are presented for ethanol plant net income, again above normal and below normal.[5] The recent success of the ethanol industry has occurred in an environment much like that of box A which depicts below normal corn farming net income and above normal ethanol plant net income. In such a case an ethanol plant investment held great appeal to many Midwestern farmers. With the corn price increases beginning in the fall of 2006, it was evident that enough ethanol plants had been built to positively influence the price of corn. Farmers owning ethanol plants at this later time thus found themselves in a situation more similar to box B, namely that of off-farm income not being needed nearly as much, but plant ownership likely still helpful. For farmer-investors, this was a very attractive situation marked by both above normal net income on the farm as well as at the plant. Starting one year later, in the fall of 2007, it was evident that enough ethanol plants had been built that the situation became more equivalent to box C wherein farming net income remained above normal, but plant net income suffered. Ironically, box C depicts a case where non-plant-investing corn farmers could be better off than plant-investing corn farmers.

Farmer-investor concerns are reflected in a recent statement by Rick Tolman, the CEO of the National Corn Growers Association: "I try to remind members that this [an ethanol plant] is an investment, like other investments. You decide the time to get in and time to get out" (Lambrecht, p.1). Such caution marks a contrast to the ethanol plant investment enthusiasm which existed over the previous several years. This concern motivates the corn farming industry's on-going enthusiasm for ever higher reformulated gasoline requirements and raises once again the basic conflict explored over two decades ago by Chattin and Doering. At that time Chattin and

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[4] Although it is very difficult to provide a precise definition of normal, the following can be said. Regarding farming, in a lengthy on-going farm records study, Norquist *et.al* calculate the 20 year average return on farm assets to be 9.25% in southwestern Minnesota. Regarding ethanol, ADM's 20 year average return to stockholders has been 26.3%. Admittedly, neither of these statistical series are entirely pure. ADM includes many types of grain handling businesses while the southwestern Minnesota series includes 59% crop farms and an additional 14% which receive some income from cash crops. On the positive side, both these series are actual historical information as opposed to being mere simulations.

[5] See footnote 4 for a definition of "normal."

Exhibit 3: The Relative Need for Ethanol as an Off-Farm Income Source as Determined by the Four Possible Combinations of Corn Farming Net Income and Ethanol Plant Net Income

	If Corn Farming Net Income Below Normal:	*If Corn Farming Net Income Above Normal:*
If Ethanol Plant Financial Performance Above Normal:	A. Off-farm Income Needed, Plant Ownership Helpful	B. Off-farm Income Not Needed, Plant Ownership Helpful
If Ethanol Plant Financial Performance Below Normal:	D. Off-farm Income Needed, Plant Ownership Harmful	C. Off-farm Income Not Needed, Plant Ownership Harmful

Doering discussed the fact that corn growers advocated ethanol for its corn price enhancing potential (a pseudo farm policy) whereas renewable energy advocates preferred low corn prices as it would reduce ethanol manufacturers' cost of goods (i.e., corn price).

In all of the above discussed combinations of exhibit 3, either farming or ethanol manufacturing, or both operate in the investor-farmer's favor. Only box D depicts the simultaneous occurrence of below normal corn farming net income and below normal ethanol plant net income. Corn farmers have yet to confront this eventuality. However, other heavy corn using industries such as feedlots, swine producers, sweetener manufacturers, and feed mills have, from time to time, all experienced losses due to excess capacity. There is no reason to believe that the ethanol industry will be immune. In the situation of box D, a farmer-investor might well find a publicly traded ethanol stock to have been a preferable investment *vis-à-vis* an ethanol plant, as public stock shares have greater liquidity.

A Corn Farmer's Cost

Using the virtual approach, how much would a farmer have to spend in order to own the processing capacity used to make ethanol out of his/her crop? Exhibit 4 shows that in the 2005-6 marketing year, the average corn grower in Iowa is estimated to have grown 40,952 bushels worth a total value of $75,761. Were a farmer of this size to participate in building an ethanol plant in order to accommodate all his/her corn production, then the cost might be approximated as $3.86/bushel in capital (from exhibit 1) multiplied by the 40,952 bushels of corn production giving a total of $158,075. When compared to this farmer's 2005-6 corn sales of $75,761, such is a very large figure. On the other hand, making this investment on a virtual basis would have only cost approximately $0.73/bu.in December 2007 (exhibit 2) times the 40,952 bushels of corn production or $29,895. Alternatively, in July 2006, it would have cost as high as $2.11/bu. for a total of $86,409. Thus one can see that the virtual investment is the least cost approach. Of course, the wisdom of any ethanol investment is uncertain at this time. One important reason for this is so many plants are currently under construction. In December of 2007 the Renewable Fuels Association (RFA) shows sixty-six new plants under construction. Ethanol company stock prices reflect this uncertainty as they show a stock price decline of 65% in only one and one-half years (exhibit 2).[6]

Exhibit 4: Iowa Corn Production, Value of Production, Number of Farmers, and Associated Averages for Marketing Years 2002-3 to 2005-6.

	2002-3	2003-4	2004-5	2005-6
Iowa Corn Production (000 bu.)[a]	1,931,550	1,868,300	2,244,400	2,162,500
Value of Iowa Corn Production ($000)[a]	$4,288,041	$4,427,871	$4,466,356	$4,000,625
No. of Iowa Corn Farmers[b]	52,806	52,806	52,806	52,806
Averages per Iowa Corn Farmer:				
Dollars	$81,204	$83,852	$84,580	$75,761
Corn Production (Bu.)	36,578	35,381	42,503	40,952

[a] USDA-NASS. *Agricultural Statistics*, various years.
[b] USDA. *Census of Agriculture.* 2002.

Ethanol Plant Downstream Investment - Marketing

The VEST model was originally conceived as a theoretical means by which farmers could integrate farther downstream in their marketing chain, in effect adding value to the raw commodity they grow. Accordingly, the model sprang from the size of a farmer's annual crop production and used that as a means to calibrate the cost of purchasing stock in publicly held firms so as to virtually process farm output. In like fashion, one can apply the VEST model to the farther downstream integration of an ethanol plant.

Most ethanol is used by automobile fuel blenders to make either E-15 (a fifteen percent ethanol/gasoline product) or, less commonly, E-85 (an eighty five percent ethanol/gasoline product). Accordingly, when applying the VEST model here, the ideal company to invest in would be one whose assets were focused on the blending, marketing, and retailing of gasoline. As such the largest five US oil companies, Exxon, Chevron, Conoco-Phillips, Shell, and BP, would not be ideal candidates because much of their capital structure is devoted to oil exploration, recovery, and transportation.

[6] Another key reason for uncertainty regards the need to continue the blender's credit of $0.52 per gallon of ethanol used in motor fuels. This will be an on-going political effort, and an uncertainty, facing many involved in the ethanol industry.

Exhibit 5 presents a December 2006 calculation of VEST coefficients for eight US oil companies potentially more suitable to the case at hand. These have a business emphasis on the downstream activities of refining, blending, delivery, and retailing. Valero is largest with market capitalization of $36.6 billion while Delek US Holdings is smallest with market capitalization of $1.1 billion. The VEST coefficients for these eight companies range from a high of 1.07 in the case of Frontier Oil to a low of 0.26 in the case of Sunoco. Exact reasons for variation are unknown as each company has a somewhat unique business model and each is also evaluated differently by stock market investors. When a weighted average is taken amongst these eight companies, the vest coefficient is 0.43. In other words, when taken as a group, these eight oil marketing companies have a stock market evaluation equal to 43% of their cost of goods for processing and subsequent resale.

Exhibit 5: VEST Coefficients for Selected Oil Companies with a Downstream Emphasis [a]

Company Name	Ticker Symbol	Market Capitalization	Cost of Goods Sold	Vest Coefficient[b]
		($000)	*($000)*	
Alon USA Energy	ALJ	$1,366,320	$2,734,000	0.50
Delek US Holdings	DK	$1,112,480	$2,818,000	0.39
Frontier Oil	FTO	$4,406,000	$4,115,000	1.07
Holly Corp.	HOC	$2,875,670	$3,349,000	0.86
Sunoco	SUN	$8,507,050	$32,947,000	0.26
Tesoro	TSO	$6,557,280	$16,314,000	0.40
Valero Energy	VLO	$36,686,559	$81,267,000	0.45
Western Refining	WNR	$1,729,310	$3,653,000	0.47
Totals / Average		**$63,240,669**	**$147,197,000**	**0.43**

[a] Source: Thompson Financial for the fiscal years ending 12/31/06.
[b] vest coefficient = (market capitalization / cost of goods sold).

The product of this vest coefficient of 0.43 and an ethanol plant's annual sales determines the amount of stock needed to virtually account for the capital cost (and reap the benefit from) the downstream sale of ethanol. Ethanol plant sales, as shown in figure 1, averaged 37.4 million gallons. If multiplied by the Nebraska 2007 average ethanol price of $2.24/gal. (Jan. – Nov. basis) an ethanol plant's annual sales can be estimated at $83.8 million. Thus the virtual amount of stock an ethanol plant would need to purchase to reach VEST would be $36.0 million (that's .43 x $83.8 mil.). On a per bushel basis (using the 13.7 million bushel plant input average in exhibit 1) this investment equals $2.62/bu. Hence one can see that to receive such downstream earnings, substantial investment is required relative to the cost of an ethanol plant itself. (From exhibit 1, it can be seen that the ethanol plant itself is estimated to cost $3.86/bu.). With or without such a virtual downstream investment, ethanol plant owners still need to search for the best possible way to sell their physical commodity.

Ethanol Plant Downstream Investment - Transportation

According to Denicoff, “in 2005, rail was the primary transportation mode for ethanol, shipping 60 percent of ethanol production” (p.6). Denicoff also notes, “concern about the adequacy of transportation infrastructure to efficiently ship ethanol and co-products” (p.7). If ethanol plant management wants to take some protection from this problem, an application of the VEST model could be made to rail transportation as follows. Namely,

3) $VEST_r = EPHC \times (MKT\ CAP / TRR)$

where $VEST_r$ is the dollar amount of railroad stock an ethanol manufacturer would need to purchase to be fully vested in the capital requirement of its rail shipping needs, EPHC is the annual rail hauling cost of the ethanol plant, MKT CAP stands for the market capitalization of the publicly-held railroad company which is shipping the plant’s ethanol, and TRR is this railroad’s total annual revenue.

Equation (3) can be quantified for 2006 as follows. The Burlington Northern Sante Fe railroad (stock symbol BNI) had a VEST coefficient (MKT CAP / TRR) of $2.94 million in MKT CAP divided by $14,985 in TRR or 0.20. An estimate of EPHC can be taken from Denicoff who reported that the single car rate to ship ethanol from the Midwest to west coast markets was $5,300 per car for a 29,400 gallon railcar. Our average plant from exhibit 1 produced 37.4 million gallons of ethanol per year. Thus 1,272 cars would be shipped annually for a total EPHC of $6,742,000. Multiplying this amount by the 0.20 VEST coefficient yields $VEST_r$ of $1,348,000. When $VEST_r$ is divided by corn input of 13,700,000 bushels (from exhibit 1), the per bushel cost of reaching VEST would be $0.10/bu. This then would be a per bushel approximation of the amount of BNI stock such an ethanol plant could choose to purchase so as to realize an investment return from general (not necessarily ethanol) shipping rents successfully captured by this railroad.

Conclusion

Many Midwestern corn farmers have already chosen to invest heavily in a bricks and mortar extension of their farms into ethanol manufacturing. We present the VEST model first as a means to understand what the stock market can tell us about these investments. We conclude that the stock market values ethanol companies at less than the cost to build their physical plant. This may be because the U.S. stock market is discounting the future success of all new public companies in the ethanol industry or simply because the present financial outlook for the industry is not a good one. We show that farmers investing in ethanol plants face a changed matrix of outcome and risk. In the present environment of above normal farm earnings this may be tolerable. However, should it be the case that farm earnings retreat from their above normal levels while ethanol plant earnings are also at below normal levels, it is the case that stock market investments in ethanol can hold more appeal than direct investment due to the stock market's greater liquidity. Lastly, we suggest that ethanol plant owners themselves might consider using the VEST model to capture downstream returns from the ethanol they produce and/or to limit exposure to transportation expenses. Stock market investment to capture downstream marketing returns is very costly; almost equaling the cost of an ethanol plant itself. Taking protection from transportation cost problems associated with rents imposed by rail carriers is far less costly to do.

Siebert, Jones and Sporleder state, "VEST must be viewed not so much as an optimization strategy but instead as one dimension among many to be included in the farmer's evaluation of any new value added investment" (p. 566). Great uncertainty exists surrounding US ethanol plant profitability. Factors such as ethanol supply, the US government's ethanol blending credit of $0.52/gal., the supply of corn, the price of oil, and many other factors will determine the future profitability of this industry. Further, trends regarding many of these matters have been at least partially responsible for increases in world grain prices. As agribusiness managers at all levels in the food marketing chain continue to adapt to such price change, future research on the potential of virtual investment concepts is likely to have considerable merit.

References

Chattin, B. and O.C. Doering III. "An Alcohol Fuels Programme: Will it Solve Surplus Grain Production?" *Food Policy* (February 1984): 35-43.

Denicoff, M.R. Ethanol Transportation Backgrounder. USDA-AMS. September 2007. 29pp.

Lambrecht, Bill. "Big Guys Step In As Ethanol Hit a Wall." *St. Louis Post-Dispatch*. December 2, 2007.

Nebraska. Official Nebraska Government Website. Nebraska's Unleaded Gasoline and Ethanol Average Rack Prices. www.neo.ne.gov/statshtml/66.html (accessed on April 5, 2007).

Norrdquist, D.W., J.N. Kurtz, R. Holcomb, and G.J. Paulson. 2007 Annual Report of the Southwestern Minnesota Farm Business Management Association. Staff paper P08-2 Dept. of Applied Economics. University of Minnesota. March 2008. 87pp.

Reinhardt, F. J. Weber, and M. Shelman. *Mid-Missouri Energy 9-706-016.* Boston: Harvard Business School. July 2006.

Renewable Fuels Association. Ethanol Biorefinery Locations. (www.ethanolrfa.org, accessed on December 17, 2007).

Siebert, J.W., R. Jones and T.L. Sporleder. "The VEST Model: An Alternative Approach to Value Added." *Agribusiness: An International Journal* 13 (November – December 1997): 561-567.

Thompson Financial. Thompson ONE Banker.

USDA-NASS. *Agricultural Statistics.* nass.usda.gov/publications/ag-statistics/agr/06 (and various earlier years).

USDA. *Census of Agriculture*. 2002.

