The United States Tobacco Industry after the Buyout

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Abstract

The U.S. tobacco industry was highly supported by the U.S. government for more than 70 years until the buyout of 2004. The elimination of the quota and price support program limited government intervention and made U.S. tobacco producers more vulnerable to market risks. It also resulted in significant structural changes that affected the tobacco industry at every level from the local farm to regional and national market levels. We provide an overview and an estimation of the situation in the U.S. tobacco industry before and after the buyout and identify how the enacted policy change affected the U.S. tobacco leaf market.

Introduction

The Fair and Equitable Tobacco Reform Act of 2004 ended the long era of the tobacco quota program and began the transition of the U.S. tobacco industry towards free market conditions involving significantly higher levels of risk associated with U.S. tobacco production (USDA, FSA, 2010).

The tobacco program was established under the Agricultural Adjustment Act of 1938 as a means to raise and stabilize tobacco prices and income. Under the program, tobacco farmers agreed to restrict supply via marketing/acreage allotments (or quotas) in exchange for minimum price guarantees. If tobacco companies did not bid above the predetermined price support level at regulated tobacco auctions, grower cooperatives purchased the surplus tobacco using Commodity Credit Corporation (CCC) funds. Price support levels were determined by a weighted average of changes in production costs and lagged market prices. National marketing quotas were set each year based upon the domestic purchase intentions, exports, and CCC loan stock levels. The marketing quotas for U.S. tobacco were initially divided among tobacco growers based on production history. Over the years available quota had been dispersed among

active tobacco farmers who inherited or purchased quota as well as heirs of tobacco farmers and non-producers who purchased farms with tobacco quota. The quota could also be rented or sold (Rucker, Thurman, and Sumner, 1995). Thus, under the quota program both quantity supplied and prices received by tobacco farmers were controlled by the U.S. government. The program was modified several times throughout the years of its existence to allow for a more efficient transfer of marketing quotas, primarily within county boundaries (Brown, Snell, and Tiller, 1999).

However, the implementation of the price support program, among other factors, had a negative effect on demand for U.S. tobacco. Before the elimination of the program the U.S. tobacco leaf market had faced declining demand for several years. Factors depressing demand for U.S. leaf included foreign competition in the domestic market (increasing imports), foreign competition in the export market (decreasing exports), declining U.S. cigarette consumption, and declining U.S. cigarette exports (Capehart, 2003).

Per capita tobacco product consumption in the United States has continued to decline although the decline in the consumption of overall tobacco products is not as steep as it is for cigarettes. For example, from 1996 to 2006 per capita cigarette consumption declined 29.2% while per capita consumption of tobacco products in general declined 15.2%, suggesting that the share of per capita tobacco consumption for products other than cigarettes may be growing (Dohlman, Foreman, and Da Pra, 2009). Moreover, despite the decline in per capita consumption, the total domestic consumption of nonsmoking tobacco, especially snuff, has been increasing steadily since the 1980's as workplace and restaurant smoking restrictions have expanded (Bickers, 2006). Additionally, total U.S. consumption of cigars and smoking tobacco rose over a five-year period ending in 2007, while consumption of cigarettes fell. This explains

why the demand for burley and flue-cured tobacco used primarily in the production of cigarettes has a declining pattern while the dark tobacco leaf used in the production of snuff is in demand (Da Pra and Arnade, 2009).

Although the elimination of the policy made the tobacco industry more competitive with respect to producers, the tobacco leaf market as a whole cannot be considered highly competitive. In fact, some consider the tobacco market as manifesting monopsony power executed by the cigarette manufacturers in domestic leaf tobacco procurement. According to this viewpoint there is substantial departure from competitive pricing by cigarette manufacturers in the input market for domestic unprocessed tobacco. Moreover, U.S. cigarette manufacturers occasionally exert monopsony market power of a much smaller magnitude in the world tobacco market (Raper and Love, 2007).

It has been alleged that since only five cigarette companies (Altria Group, Reynolds American Inc., Lorillard, Commonwealth Brands, and Liggett) control more than 90 % of all sales in the U.S., this constitutes an oligopolistic market structure. Altria Group is the largest manufacturer, accounting for almost half of the cigarette market. R.J. Reynolds and Lorillard Tobacco Co. are the industry's second and third largest manufacturers with market shares of 27.8 and 9.7 %, respectively, while Commonwealth Brands and Liggett are the industry's fourth and fifth largest manufacturers with market shares of 3.7 and 2.4 %, respectively (Tiller, Starnes, and Feleke, 2010).

However, the tobacco farming segment of the market is highly competitive due to fragmentation. There are thousands of participants in the United States alone. Competition among growers is based primarily on price and the ability to meet customer specifications. Competition is rising as the demand for tobacco used in cigarettes is declining globally forcing

growers to compete for a share of a contracting market. The removal of government assistance is also intensifying competition between incumbent farmers (Panteva, 2010).

International trade is a key feature of this industry. From the demand prospective, there are two market segments that represent demand for U.S. tobacco leaf. The major market segment (83.3%) for the purchase of unprocessed tobacco leaf grown in the United States encompasses cigarette manufacturers overseas, chiefly those in Switzerland, the Netherlands, Germany, and China. European manufacturers purchases American flue-cured and burley tobacco for perceived quality attributes though less price competitive than other foreign alternatives. The remaining market segment (16.7%) includes domestic tobacco product manufacturers (Panteva, 2010).

As for the supply side of the tobacco industry, it is greatly affected by an increasing volume of foreign tobacco. Imports as a share of domestic demand increased over much of the 10-year period ending in 2009 as tobacco product manufacturers purchased less expensive tobacco leaf from overseas markets. However, following removal of the price support program in 2004, imports as a share of domestic demand have declined from a peak of 91.5% in 2005 to an estimated 76.5% in 2009. The price difference between foreign and domestic tobacco leaf fell following 2005. Nevertheless, imports and domestic production have been constrained somewhat by a decline in cigarette consumption in the United States over the past five years (Panteva, 2010).

While the U.S. domestic industry is struggling with declining demand, the amount of imported tobacco leaf has been increasing over time. Moreover, technological changes in the tobacco manufacturing industry brought new types of tobacco products that do not require high-quality tobacco. This phenomenon has been reinforced by increased sales of discount (generic) cigarettes which allow the use of cheaper tobacco and the establishment of many small discount

cigarette manufacturers. Historically, the high price of U.S. leaf has been based partly on quality differentials and increasingly on the effects of the federal price support program which boosted domestic leaf prices (Capehart, 2007).

The end of the tobacco program ushered in structural changes which manifested partly in a decline initially in tobacco prices (20%) and farm consolidation (farms became fewer but larger). Indeed, as shown in figure 1, the number of tobacco farms fell by more than half in the year after the buyout. After elimination of price supports escalating input costs caused smaller tobacco farms to exit the market, switching to other crops (Bickers, 2008). However, the remaining producers farmed more tobacco acres and operated larger farms. Moreover, planting flexibility spurred regional shifts in production areas. Flue-cured and burley tobacco became more concentrated in the two major tobacco producing states (flue-cured in North Carolina and burley in Kentucky). Tobacco auctions and government price support and loan operations were replaced with marketing contracts between farmers and buyers for the setting of price, quantity, and quality standards. Marketing contracts allow for greater control and less risk in the absence of government intervention. As a result of these massive and historical changes, U.S. tobacco exports have increased since 2004. Figure 2 shows the amount of U.S. tobacco exports versus the amount of imported tobacco leaf for the period from 2004 to 2008. In addition, the gap between imported and U.S. tobacco prices shrank after the buyout (Dohlman, Foreman, and Da Pra, 2009).

Literature Review

Several survey studies of U.S. tobacco farmers have been conducted in different tobacco growing states in the aftermath of the tobacco buyout program. However, one study about the buyout program was conducted before the actual buyout occurred. The study used data from four

surveys of a panel of North Carolina tobacco farmers conducted between 1997 and 2004. The goal of the study was to investigate changing farmer attitudes and intentions with respect to a quota buyout. The results obtained showed large negative shifts in attitudes towards the future of tobacco production. A large proportion of tobacco farmers indicated that they would exit production in the event of a buyout. Older farm operators and those with less tobacco acreage were found to be more likely to exit production if the federal tobacco program ended (Beach et al., 2006). The results of the study proved to be true when shortly after the buyout, the number of tobacco farms decrease significantly. Indeed, the number of farms fell by more than half in the year after the buyout. However, the remaining producers farmed more tobacco acreage on larger farms (Dohlman, Foreman, and Da Pra, 2009).

A study conducted after the elimination of the quota program used data from a mail survey of burley tobacco producers to explore their intentions and attitudes regarding plans to continue growing tobacco. The study found that farmers who intended to remain in the industry were more likely to be younger, to be more highly educated, to have a larger household, and to consider themselves full-time farmers. Moreover, those with larger tobacco acreages with higher percentages of total farm income coming from the tobacco enterprise were more likely to continue growing tobacco. Also, not surprisingly, farmers with marketing contracts and higher average yields were more likely to remain in tobacco production. Respondents indicated that some of the most pressing challenges for the future of tobacco production were the availability and affordability of hired labor, increasing costs of production, and contract prices sufficient to make tobacco profitable (Tiller and Jones, 2007).

A recent study of the post buyout period conducted by Pushkarskaya and Vedenov (2009) was also devoted to the analysis of factors that affected the decision to exit tobacco production in

the wake of the tobacco buyout program using the data collected through a survey of Kentucky tobacco farmers. They show that with the mass exit of tobacco farmers the more efficient farms were not always remaining in the industry. They found that other factors, such as the availability of alternative employment and sunk/divestment costs, significantly affect the exit decision. Younger producers were found to be particularly sensitive to the availability of alternative employment opportunities. Thus, there might be a tendency for spatial restructuring of tobacco farming, not according to land productivity, but according to external economic conditions.

The above analyses of changes in the U.S. tobacco farming industry focused mainly on the supply side of the U.S. tobacco market. However, there is also literature focusing on the demand for U.S. tobacco leaf.

The per capita consumption by types of tobacco has been shown to be different with a shift towards dark tobacco from flue-cured or burley types. In order to determine whether this tendency reflects a change in tastes and preferences of the U.S. consumers, a study measuring the cross-price elasticities of tobacco products was conducted. Specifically, the study considered the substitutability of cigarettes with other tobacco-containing products. The results of the analysis showed that most consumer expenditures on tobacco products remained on cigarettes. However, smoking tobacco and cigars were found to be substitutes for cigarettes. Moreover, the results suggest that an increase in the cigarette tax without a similar increase on other products may accentuate the substitution effect towards other tobacco products (Da Pra and Arnade, 2009).

A recent study explores the economic welfare consequences of the Family Smoking Prevention and Tobacco Control Act of 2009 on tobacco growers. The Act gives the Food and Drug Administration (FDA) the authority to regulate the manufacturing and marketing of tobacco products. According to the study changes in manufacturer utilization of tobacco could

result from both the supply and demand side of the tobacco industry. The model used to calculate the effects of the tobacco product market regulation is a system of demand and supply equations of vertically linked markets for cigarettes at the wholesale level and tobacco leaf at the farm level. Simulation results suggested that FDA regulation could affect the price, quantity, revenue, and producer economic rent for tobacco. If U.S. cigarette consumption declines, the price and quantity of tobacco also decreases, all else equal. Consequently, tobacco growers would suffer losses in both gross revenue and producer surplus. Moreover, an imposed increase in cigarette prices has a similar negative impact on tobacco prices, revenue, and producer surplus (Tiller, Starnes, and Feleke, 2010).

Methodology and Model

Understanding how the buyout initiative influenced the U.S. tobacco industry at the first-handler level can be seen through analysis of supply and demand determinants of the tobacco leaf market pre- and post-buyout. This is the first known econometric approach in this vein. The model consists of a system of supply and demand equations for the U.S. tobacco leaf market and is specified according to Ferris (2005) and the literature previously cited:

(1) $P_t = f(Q_t, DSPI_t, NEX_t, T_t, D_t)$, and

(2) $Q_t = g(P_t, PPF_t, YLD_t, D_t)$,

where P_t is price received by U.S. tobacco farmers in period t, Q_t is volume of U.S. tobacco production, $DSPI_t$ is U.S. per capita disposable personal income, NEX_t is U.S. tobacco net exports, T_t is a trend variable, D_t is a dummy variable for the pre and post buyout program, PPF_t is the index of prices paid by U.S. farmers, and YLD_t is U.S. tobacco yield, Table 1.

Equation 1 represents the demand for U.S. tobacco leaf where income ($DSPI_t$) has an indirect effect as consumers use tobacco leaf indirectly via tobacco products. Equation 2 represents the supply of U.S. tobacco leaf. Because of the tight relationships between producers and manufacturers via the government program and/or marketing contracts, production and supply may be considered essentially the same. For the same reason supply response is not characterized by lagged relationships.

The simultaneous system with two endogenous variables, P_t and Q_t, is specified in log-linear form:

(3) $\quad lnP_t = a0 - a1lnQ_t + a2lnDSPI_t + a3lnNEX_t - a4T_t - a5D_t + u_t$, and

(4) $\quad lnQ_t = b0 + b1lnP_t - b2lnPPF_t + b3lnYLD_t - b4D_t + e_t$,

where u_t and e_t are error terms. Exogenous variables act as demand and supply shifters in the U.S. tobacco leaf market. The dummy variable (D_t) for the change in government policy is expected to have a significant effect on U.S. demand and supply. Both demand and supply are expected to decrease as manufacturers have more freedom to source tobacco internationally and producers as a whole are less willing and/or able to supply tobacco leaf without government protection. The result should be both downward and upward pressure on price from the demand and supply sides of the market, respectively. Net exports of tobacco (NEX_t) are expected to increase demand for U.S. tobacco leaf based on the trend. This implies that changes in consumption patterns, income levels, and population growth in the rest of the world will positively impact U.S. net exports. The trend variable (T_t) is included to account for the change in U.S. consumer tastes and preferences due to rising health concerns (Tiller, Starnes, and Feleke, 2010) and is expected to manifest in decreasing demand.

Data

Annual data, before and after the buyout program, covering the period 1975 to 2008, are used in this analysis. Data for the volume of U.S. tobacco production in millions of pounds, U.S. tobacco yield in pounds per acre, price in dollars per pound, the index of prices paid by farmers were obtained from the National Agricultural Statistics Service of the U.S. Department of Agriculture database (USDA, NASS, 2010).

Average disposable personal income data (billions of dollars) were obtained from the Federal Reserve Bank of St. Louis (2010). U.S. population data (millions) were taken from the U.S. Census Bureau International Data Base (2010). Per capita disposable personal income in thousands of dollars was computed from average disposable personal income from the Federal Reserve Bank of St. Louis and population from the U.S. Census Bureau.

The variable for U.S. net exports (NEX_t) in billions of dollars was computed from U.S. tobacco export and import data obtained from USDA, FAS (2010). All dollar denominated variables are in 1982-1984 dollars based on the CPI (USDL, BLS, 2010). The base for the index of prices paid by U.S. farmers (PPF_t) is 1990-1992.

Results

The structural model is estimated using the Generalized Method of Moments or GMM with HAC (heteroskedasticity-autocorrelation) robust standard errors to obtain structural coefficients, table 2 (Hayashi, 2000; Baum, 2006). All variable coefficients in the U.S. tobacco leaf model are statistically significant at the 5% level except the coefficient for the index of prices paid by farmers (PPF). Apparently, the government program and marketing contracts mitigated the effects of input costs on supply. All coefficient signs are as expected, even the negative sign for income (DSPI). It would seem that tobacco has become an inferior good for

much of the U.S. population. The R-square values for the supply and demand equations are 0.78 and 0.97, respectively.

The supply equation in Table 2 shows a negative shift in supply after the buyout program (D), all else equal, by -0.218 or 5.5%, putting upward pressure on price. This reflects the structural shift to marketing contracts with more select producers. The policy variable (D) for the demand equation also shows a negative shift in demand after the buyout program, all else equal, by -0.118 or just 0.51%, a mild negative impact on price. This reflects the ability of manufacturers to more easily source tobacco internationally. Further, there are other negative forces impacting the demand for U.S. tobacco leaf. As indicated before, there is the inferior good aspect as well as the negative impact of the change in tastes and preferences (T). The negative shift in demand because of the trend variable (T) is about 3.5% in a given year measured at the mean, all else equal. The only positive influence in the demand equation is net exports (NEX) which shows that price is somewhat responsive to net exports by virtue of the small price flexibility coefficient of 0.069. Indeed, U.S. tobacco leaf production has generally increased since the buyout program, rebounding from a low of 645.0 million pounds in 2005 to 800.5million pounds in 2008, while at the same time the real price in 1982-84 dollars moved sideways averaging almost $0.84 per pound.

Price elasticity of supply (0.941) is close to unitary indicating that supply response is on a par with the price incentive, Table 2. However, the own-price flexibility of demand (-0.079) shows that price is only mildly responsive to quantity, indicating effective price control via the government program and marketing contracts.

Conclusions

The elimination of the U.S. quota and price support program resulted in a mass exodus of farmers from tobacco production. Those remaining tended to be younger, heavily invested in fixed factor specific to tobacco production, in many cases with few alternatives, on and off the farm, and, on average, have greater tobacco acreage than before the buyout.

The purpose of this study was to examine the effects of the elimination of the government program on the U.S. tobacco leaf market using data pre and post buyout. The elimination of the government program resulted negative shifts in both supply and demand, causing both upward and downward pressure on price. Other negative shifters on demand were income and change in tastes and preferences resulting in further downward pressure on price. In the United States tobacco has become an inferior good and less and less socially acceptable. The only positive demand shifter was net exports, placing upward pressure on price. Apparently, the overseas demand for quality U.S. tobacco is growing faster than the demand for cheaper foreign tobacco by U.S. manufacturers.

As can be seen, there are several competing forces at work in the U.S. tobacco leaf market with simultaneous increasing and decreasing price effects. The net effect since elimination of the government program has been that leaf production has generally increased while the real price has moved sideways after an initial decline. Own-price flexibility of demand with price that is only mildly responsive to quantity indicates effective price control continues via marketing contracts. Further study is required to be more certain of our results as more post buyout observations become available.

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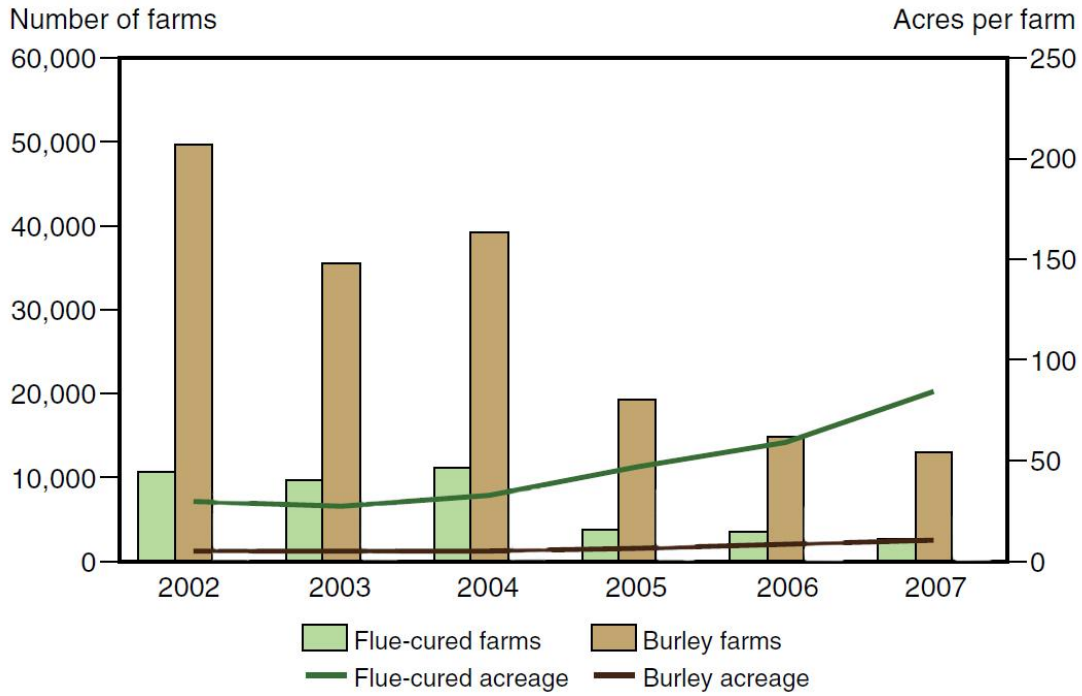
Figure 1. Changes in Number of Tobacco Farms and Tobacco Crop Acreage after the Buyout
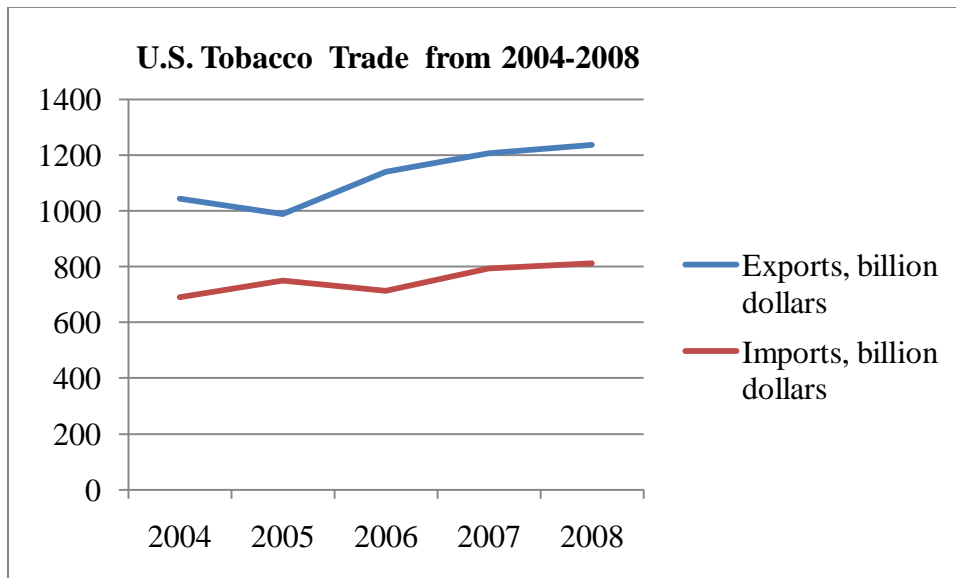
Source: Dohlman, Foreman, and Da Pra (2009).

U.S. Tobacco Trade from 2004-2008

Figure legend:
— Exports, billion dollars
— Imports, billion dollars

Figure 2. U.S. Tobacco Exports and Imports from 2004-2008

Source: USDA, FAS (2010).

Table 1. Description and Simple Statistics for Variables Included in the Model, 1975-2008

Variable	Description	Mean	Standard Deviation	Minimum	Maximum
P	Price of U.S. tobacco ($/lbs)	1.37	0.38	0.82	2.03
Q	Volume of U.S. tobacco production (million lbs)	1426.57	441.06	645.02	2182.30
PPF	Index of prices paid by farmers	102.41	31.05	47.00	183.00
NEX	Net exports of U.S. tobacco leaf (billion dollars)	561.09	354.42	122.46	1467.77
YLD	U.S. tobacco yield (lbs/acre)	2099.41	126.84	1811.00	2359.00
DSPI	Per capita average disposable personal income (thousand dollars)	12.84	2.81	1.51	16.65
POP	The U.S. population (million)	257.48	27.37	215.97	304.06
D	Dummy variable for policy change (D =1 for 2005-2008, 0 otherwise)	0.12	0.06	0	1
T	Trend variable (1975,1976, …, 2008)	1991.5	1.71	1975	2008

Source: USDA, NASS (2010); Federal Reserve Bank of St. Louis (2010); U.S. Census Bureau (2010); USDA, FAS (2010); USDL, BLS (2010); USDA, FSA (2010).

Note: All dollar values are real, 1982-1984 base. The PPF base is 1990-1992.

Table 2. GMM Estimation Results for U.S. Tobacco Supply and Demand

Variable	Coefficient	Standard Error (HAC)
Supply (Q^a)		
P	0.941**	0.1557
PPF	-0.098	0.1305
D	-0.218**	0.0365
YLD	1.486**	0.1843
Constant	-3.945**	1.1100
Demand (P^b)		
Q	-0.079**	0.0324
DSPI	-0.815**	0.1846
NEX	0.069**	0.0237
T	-0.011**	0.0036
D	-0.118**	0.0276
Constant	23.222**	6.9382

**significant at the 5% level.

[a] The instrumented variable is P and the instruments
are PPF, YLD, D, DSPI, NEX, and T; $R^2 = 0.7783$.
[b] The instrumented variable is Q and the instruments
are PPF, YLD, D, DSPI, NEX, POP, and T; $R^2 = 0.9718$.