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Financial well-being impacts of the expansion in labor costs on U.S. tobacco farms

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Abstract

The United States Department of Labor (USDOL) amended elements of the 2008 H-2A Final Rule and adopted the 2010 Final Rule, which came into effect on March 15, 2010. Compared to the 2008 H-2A Final Rule, the 2010 H-2A Final Rule is arguably more expensive for farm employers. The H-2A Final Rule provides regulations which govern the H-2A program, a guest worker program allowing U.S. farm employers to bring foreign workers into the country to perform seasonal and temporary agricultural work. The most influential cost-increasing element of the 2010 H-2A Final Rule is a change in the methodology by which the Adverse Effect Wage Rate (AEWR) is calculated. The AEWR is the minimum wage rate that must be offered and paid to H-2A workers and similarly employed U.S. farm workers. This paper estimates the economic welfare effects of the additional labor costs on tobacco farms using the Equilibrium Displacement Model. Considering the prospect of U.S. immigration reform and revision of the current H-2A program, results provide an insight into the potential effects of changes in policy and labor regulations affecting wages and admission of foreign guest farm workers.

Keywords: Tobacco, adverse effect wage rate, H-2A Final Rule, equilibrium displacement model, economic welfare effects.

INTRODUCTION

The United States Department of Labor (USDOL) amended elements of the 2008 H-2A Final Rule and adopted the 2010 Final Rule that came into effect on March 15, 2010. Compared to the 2008 Final Rule, the 2010 H-2A Final Rule is arguably more expensive for farm employers. The most influential cost-increasing element of the 2010 H-2A Final is a change in the methodology in which the Adverse Effect Wage Rate (AEWR) is calculated. The AEWR is the minimum wage rate that the USDOL has determined “must be offered and paid to U.S. and alien workers by agricultural employers of nonimmigrant H-2A agricultural workers” (Federal Register, 2010). In the 2008 Final rule, the AEWR was estimated based on the Occupational Employment Statistics (OES) wage survey that is undertaken by the Bureau of Labor Statistics (BLS) of the USDOL. However, in the 2010 Final Rule, the USDOL amended the methodology such that the AEWR would be set based on the Farm Labor Survey (FLS) of the United States Department of Agriculture (USDA). Since OES pand FLS surveys cover different farm-related employers and provide different levels of detail by occupation and geographic area, they provide different estimates of AEWR. The FLS-based AEWR is an annual weighted average hourly wage rate for field and livestock workers (combined) by region while wages from the OES survey are established by levels of skill and experience. The change in methodology from the OES wage survey

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to the FLS survey raised the national average of the AEWR by $1.02 per hour (Federal Register, 2010).

Considering the importance of labor in tobacco production, accounting for 30% to 50% of the cost of production depending on the tobacco type (Foreman and McBride, 2011) and the importance of the H-2A program among tobacco farms, accounting for nearly 25% of the H-2A labor petitions (U.S.DOL, 2009), the amended AEWR-setting rule could have a significant effect on the cost of tobacco production and hence the welfare of tobacco growers. In 2008, 75% of burley tobacco farms and 95% of flue-cured tobacco farms used hired and contract labor, which in turn provided 61% of all labor hours needed for burley production and 84% of the hours needed for flue-cured tobacco production (Foreman and McBride, 2011). Burley and flue-cured are the major tobacco types used in cigarettes.

This paper assesses the economic welfare effects of the additional increase in AEWR due to the 2010 Final Rule on tobacco farms using the Equilibrium Displacement Model (EDM) in the short-run when there is (1) no adjustment in the production process and output market, and in the long-run when there is (2) adjustment in the tobacco production process as well as in the output market.

Background

The H-2A program is a guest worker program allowing U.S. farm employers who anticipate a shortage of domestic farm labor to bring foreign workers into the country to perform seasonal and temporary agricultural work. It was authorized for agricultural work as part of the Immigration Reform and Control Act (IRCA) of 1986 pursuant to the amendment of the H–2 temporary guest worker program that was earlier established as part of the Immigration and Nationality Act of 1952.

In order to participate in the H-2A program, farm employers must comply with a set of requirements, one of which is filing an application with the DOL stating that there are not sufficient able, willing and qualified U.S. workers available to perform the intended job(s) and that the employment of foreign workers will not have an adverse effect on the wages and working conditions of similarly employed U.S. workers. To do so, they must offer the job at the highest of AEWR or the prevailing hourly, or the agreed upon collective bargaining rate, or the Federal or State minimum wage rate. In addition, they must provide for free housing, pay for inbound and outbound transportation, and abide by the 50% rule and 75% guarantee. The 50% rule requires employers of H-2A workers to provide employment to any able, willing, qualified and available U.S. worker who applies for the job until 50% of the period of the work contract has elapsed. The 75% rule requires employers of H-2A workers to guarantee to offer to each covered worker employment for a total number of hours equal to at least 75% of the workdays in the contract period. Further information on requirements is given in Vol. 75, No. 29 of the Federal register (2010).

The H–2A program is managed by three federal agencies (DOL, Department of HomeLand Security, and State Department). The DOL is responsible for labor certifications and oversight of compliance with labor laws. The Department of Home Land Security is responsible for adjudication of petitions and approval of admission in H–2A classification while the State Department is responsible for approval of visas for entry into the country.

The way the H–2A program works is that a farm employer who anticipates a shortage of farm labor during a certain period of the year needs to initiate pre-filing 75 to 60 days before their first date of need by submitting a job order to a State Workforce Agency (SWA) serving the area of intended employment. After receiving clearance with the SWA by way of an SWA–approved job order, interested farm employers apply for certification from the Secretary of Labor by filing an Application for Temporary Employment Certification with the National Processing Center located in Chicago. If they receive approval of labor certification, they then proceed with filing petitions requesting H–2A workers with the Citizenship and Immigration Services of the Department of Homeland Security. If the petitions are approved, then the prospective temporary workers need to apply to a U.S. embassy for an entry visa, which allows them to travel to the U.S. port of entry (airport, seaport or land border crossing) at which point they apply with the Customs and Border Protection of the Department of Homeland Security for admission to the country under H–2A classification. If the Customs and Border Protection approves the admission, the guest workers are issued an admission ticket known as an I–94 card (also known as the Arrival/Departure Record) stamped with a date indicating the length of time they are allowed to stay in the country as per the approved petition. They must leave the country before the expiration of the I-94 card unless an extension is granted.

LITERATURE REVIEW

A number of studies have looked into the employment, price, and profit effects of the increase in minimum wages in non-agricultural sectors (Katz and Krueger, 1992; Card and Krueger, 1994; Neumark et al., 2004). Detailed studies on the effects of the rise in minimum wages is given in Neumark and Wascher (2006) who provided a comprehensive review of more than 100 minimum wage studies published since the 1990s. Most of these studies are focused on the employment effects while the number of studies on the price and profit effects is limited (Aaronson, 1998; Card and Krueger, 1994). This is

probably because the price effects of minimum wage increases in non-agricultural sectors are too small to draw significant research attention. In the case of tobacco, however, it cannot be ignored because of the labor-intensive nature of tobacco production and the relatively larger labor cost share. Comparing tobacco with grain crops in terms of the intensity of labor (that is, the number of labor hours required per acre), tobacco is much more labor intensive than field crops. Tobacco's labor requirement ranges from 72 h per acre for flue-cured production to 151 h per acre for burley production. In contrast, the labor requirement for field crops is less than 3 h per acre (Foreman and McBride, 2011). As a result of the labor-intensive nature of tobacco production, the cost share of labor in tobacco production is high. Labor accounts for 30% of the cost of production per acre for flue-cured tobacco and 50% for burley tobacco production (Foreman and McBride, 2011). In contrast, labor cost in grain production accounts for only 5% of the variable costs of production. The labor cost share of tobacco is comparable to the most labor-intensive agricultural enterprises: vegetables, fruits and nuts, greenhouse and nursery and dairy.

MODEL

The effect of the increase in AEWR on tobacco farms due to the 2010 H-2A Final Rule is assessed using the EDM. Starting with the input side, the labor cost function of a given tobacco farm can be given by

$$C=WL, \quad (1)$$

where C is labor cost; W is AEWR, and L is total employment. Totally differentiating Equation (1) we found that

$$DC = WDL + LDW, \quad (2)$$

where DC is the change in cost of tobacco production; DL is the change in total employment due to the 2010 H-2A,and DW is the change in AEWR due to the 2010 H-2A Final Rule. Rewriting Equation (2) in log form, we found

$$C_D LNC = (WL)\, DLNL + (LW)\, DLNW, \quad (2.1)$$

where $DLNC$ is the percentage change in cost of tobacco production; $DLNL$ is the percentage change in total employment due to the 2010 H-2A Final Rule, and $DLNW$ is the percentage change in AEWR due to the 2010 H-2A Final Rule. Rearranging the terms in Equation (2.1), we found:

$$DLNC = \gamma_{DT}\, DLNW + \gamma_{DT}\, DLNL, \quad (2.2)$$

where $\gamma_{DT} = WL / C$ is labor cost share of tobacco production. Decomposing $DLNL$ (the percentage change in total employment) into domestic and H-2A employment, we have:

$$DLNL = \alpha DLNL_D + (1-\alpha)\, DLNL_{H-2A}, \quad (2.3)$$

where α is the share of domestic employment; $(1-\alpha)$ is the share of H-2A employment; $DLNL_D$ is the percentage change in domestic labor employment, and $DLNL_{H-2A}$ is the percentage change in H-2A labor employment.
Substituting Equation (2.3) into Equation (2.2) we found:

$$DLNC = \gamma_{DT}\, DLNW + \gamma_{DT}\, \alpha DLNL_D + (1-\alpha)\, DLNL_{H-2A} \quad .(2.4)$$

The demand for domestic labor can be given as

$$DLNL_D = \omega DLNW, \quad (3)$$

where ω is the own price elasticity of the demand for domestic labor. The import demand for H-2A labor can be given as

$$DLNL_{H-2A} = \omega_{H-2A}\, DLNW, \quad (4)$$

where ω_{H-2A} is the own price elasticity of the import demand for H-2A labor. Substituting Equations (3) and (4) into Equation (2.4), the percentage change in cost of production $(DLNC)$ due to the increase in AEWR can be given by

$$DLNC = \theta DLNW, \quad (5)$$

where $\theta = 1 + A$ is the coefficient of adjustment in the input market and production process, and $A = \alpha\omega + (1-\alpha)\,\omega_{H-2A}$ is the price elasticity of the derived demand for labor.
Now considering the output side, the tobacco supply function is given by:

$$DLNQ = \varepsilon(DLNP - DLNC), \quad (6)$$

where $DLNQ$ is the percentage change in tobacco production; ε is the price elasticity of the supply of tobacco; $DLNP$ is the percentage change in tobacco price; $DLNC$ is the percentage change in cost of production due to the increase in the AEWR representing the percentage change in the initial equilibrium price.
The percentage change in domestic demand for tobacco is given as

$$DLNQ_D = \eta DLNP, \quad (7)$$

where $DLNQ_D$ is the percentage change in the quantity of tobacco for domestic use; η is the price elasticity of the domestic demand for tobacco, and $DLNP$ is the percentage change in tobacco price.
The percentage change in export demand for tobacco is given as:

$$DLNQ_E = \eta_E\, DLNP_E, \quad (8)$$

where $DLNQ_E$ is the percentage change in the quantity of tobacco for export, and η_E is the price elasticity of the export demand for tobacco. The market–clearing identity for tobacco can thus be given as

Table 1. Parameters estimates of the price elasticity of demand for tobacco and labor from published sources.

Parameter	Definition	Flue-cured	Burley	Sources
η	Price elasticity of the demand for tobacco	-1.46	-1.46	Rezitis et al. (1998)
η_E	Price elasticity of export tobacco	-3.0	-3.0	Brown and Martin (1996)
ε	Price elasticity of tobacco supply	7	7	Fulginiti and Perrin (1993)
β	Proportion of domestic sales of tobacco	38%	40%	Predicted from data in NASS/USDA (2008)
α	Proportion of domestic hired labor	77%	71%	Foreman and McBride (2011)
$1 - \alpha$	Proportion of H-2A labor	23%	29%	Foreman and McBride (2011)
ω, ω_E	Price elasticity of labor	-0.40	-0.40	Moss et al. (2010)
γ_{DT}	Labor cost share in the tobacco price	30%	50%	Foreman and McBride (2011)

$$D\,LN\,Q = \beta\, D\,LN\,Q_D + (1-\beta)\, D\,LN\,Q_E, \quad (9)$$

where β is the proportion of domestic tobacco sales and is $(1-\beta)$ the proportion of export tobacco sales.

Substituting Equations (7) and (8) into Equation (9) and then substituting the resulting Equation into Equation (6), we find

$$\varepsilon\,(DLNP - DLNC) = \beta\eta DLNP + (1-\beta)\,\eta_E\, DLNP_E \quad (10)$$

Now multiplying out and collecting similar terms, the percentage change in tobacco price ($DLNP$) due to the change in cost of production can be given as

$$DLNP = \lambda DLNC, \quad (11)$$

where $\lambda = \dfrac{\varepsilon}{\varepsilon - B}$ is the coefficient of adjustment in the output market, and $B = \beta\eta + (1-\beta)\,\eta_E$.

Then, substituting Equation (5) into Equation (11), the $DLNP$ (that is, the percentage change in tobacco price due to the increase in AEWR) can be given as

$$D\,LN\,P = \kappa\gamma_{DT}\, DLNW, \quad (12)$$

where $\kappa = \lambda\theta$ is the pass-through elasticity. In the absence of adjustment, $\kappa = 1$ so that the increase in cost of production due to the increase in AEWR is fully passed on totobacco leaf purchasers.The adjustment in input and output markets mitigates the effect of the AEWR increase on tobacco price. The adjustment in the input market occurs in the production process as growers respond to the increase in the AEWR by making input substitution and reducing the number of labor hours or reducing the number of workers. This adjustment is represented by θ . The adjustment in the output market represented by λ occurs as tobacco leaf purchasers respond to the increase in tobacco leaf price. The product of the adjustment coefficients in the input market (θ) and output market (λ) provides the pass-through elasticity (κ) .

Finally, with the proportional change in tobacco price and quantity supplied thus computed, the change in producer surplus can be calculated as

$$PS = (DLNP_I - DLNC_I)\, P_{I0} \cdot Q_{I\,0}\,(1 + 0.5\,DLNQ_I) \quad (13)$$

where PS is the change in producer surplus; P_{I0} is the initial equilibrium tobacco price; Q_{I0} is the initial equilibrium tobacco output and the other terms have been defined previously.

Data

Data used in this study came from the Center for Tobacco Grower Research (CTGR) at the University of Tennessee, the USDOL and the National Agricultural Statistics Service of the U.S. Department of Agriculture (NASS/USDA). Table 1 provides published parameter estimates (e.g., the price elasticity of the demand for labor, the price elasticity of the demand and supply of tobacco, the proportion of domestic and H-2A labor, the proportion of tobacco for domestic and export sales) and used in the simulation for burley and flue-cured tobacco.

The share of domestic labor versus H-2A labor, the labor cost share, the share of total tobacco production used for domestic consumption and exports varies by type of tobacco. Comparing burley and flue-cured tobacco, domestic labor (migrant hired and contract labor plus operator and family labor) account for 77 and 71% of the total number of labor hours needed in flue-cured production and burley production, respectively (Foreman and McBride, 2011).USDA defines migrant farm workers as those who cross county or state lines and stay away from a U.S. home overnight to do farm work for wages.

The remaining 23% flue-cured production and 29% in burley production are provided by non-immigrant hired and contract labor such as H-2A labor. Table 2 provides the base value of the variables used in the simulation. With regard to the wage rate, the 2008 AEWR in Tennessee and Kentucky where burley is grown was $9.13 per hour while the 2011 AEWR in the same states in 2011 is $9.48 per hour, indicating that the wage cost of burley tobacco production would increase by nearly 4%.With regard to flue-cured tobacco, the 2008 AEWR in North Carolina and Virginia where flue-cured is grown was $8.85 per hour while the 2011 AEWR in the same states in 2011 was $9.30 per hour, indicating that the wage cost of flue-cured tobacco production would increase just over 5%.

Table 2. Wages, production and price variables by tobacco type and sources.

Variable	Flue-cured	Burley	Source
Acres per farm	97.0	15.0	CTGR
Yield (lb. per acre)	2382	2122	CTGR
Total production in 2008 ('000,000)	499.2	201.5	NASS/USDA
Labor hours per acre	72 h	151 h	Foreman and McBride (2011)
AEWR ($/h in 2008)	8.85	9.13	DOL
AEWR ($/h in 2011)	9.30	9.48	DOL
Tobacco price ($/lb. in 2008)	1.76	1.67	NASS/USDA

CTGR, Center for Tobacco Grower Research; NASS/USDA: National Agricultural Statistics Service/ U.S. Department of Agriculture; DOL: Department of Labor.

RESULTS AND DISCUSSION

The increase in cost of tobacco production due to the increase in AEWR would affect the welfare of tobacco growers depending on whether and how much the additional cost is translated into higher price. In a perfectly competitive market with constant returns to scale, average cost equals marginal cost, which in turn equals the output price. Thus, any increase in labor costs will add to the tobacco farm's average and marginal costs, and therefore to the output price by the amount of the labor share of operating cost. The higher labor cost is then passed on to tobacco leaf purchasers. The question is how much of the increase in costs due to the increase in the AEWR is passed on to tobacco leaf purchasers. As tobacco growers are faced with a higher labor cost due to the increase in AEWR, they have three options. The first one is simply absorbing the added labor cost through reduced profits, but that is unlikely to be sustainable. Under this option, the added labor cost is fully borne by tobacco growers. The second option is a case where growers will continue employing the same number of workers as before and keep production constant as AEWR increases, and simultaneously tobacco leaf purchasers will keep their tobacco purchases constant with increasing tobacco prices. Under this option, the added labor cost is fully passed on to tobacco leaf purchasers. The third option is the case where both tobacco growers and tobacco leaf purchasers make adjustments in their production and purchase plans, respectively. Tobacco growers make adjustments to pay for the added costs through reduced employment of workers or cutting employee work hours. Tobacco leaf purchasers make the adjustments through reduced purchases. Under this option, the added labor cost is shared between tobacco growers and tobacco leaf purchasers.

Option I: No adjustment in the input and output markets but growers absorb the added labor cost

Under this option, there is no employment effect but there is a profit effect because employing the same number of workers at the new higher wage rate increases the cost of production. Since growers are assumed to bear the full cost of the increase in AEWR under this option, and employment remains the same, there is no change in output supply and consequently no change in price. As a result, tobacco leaf purchasers are expected to buy the same quantity of tobacco, leaving total revenue unchanged. However, growers would be worse off with a loss in producer surplus. Results indicate that in the aggregate flue-cured growers will be worse off with a loss of $13.4 m while burley growers will be worse off with a loss of $6.4 m in producer surplus. This option is unlikely to be sustainable because most tobacco growers cannot afford to absorb the extra costs and keep the price steady. Therefore, the most *sustainable* options for most tobacco growers are allowing the additional labor costs to be fully or partially passed on to tobacco leaf purchasers.

Option II: No adjustment in both the input and output markets but tobacco growers passes the added labor cost on to tobacco leaf purchasers

Under this option, there is no adjustment in both the input and output markets in the sense that neither tobacco production nor tobacco purchase is affected as higher AEWR increases the cost of production. Growers continue employing the same number of workers and keep the input proportion constant, and tobacco leaf purchasers do not respond when the added cost is passed on to them in the form of higher tobacco price.

Consequently, the full effect of the increase in cost induced by the higher AEWR is passed on to tobacco leaf purchasers in the form of a higher tobacco leaf price. The increase in tobacco leaf prices due to the increase in cost induced by the increase in the AEWR depends on the importance of labor in the production of tobacco. Table 3 shows that with no change in employment, the 5.1% increase in the AEWR in flue-cured growing states such as North Carolina and Virginia between 2008 and 2011 would result in cost of flue-cured production increasing 1.53% in view of a cost share of 30% ($0.3 \cdot 5.1$). In contrast, Table 4 shows that the 3.8% increase in AEWR in burley growing states such as Kentucky and Tennessee between 2008 and 2011 would result in the cost of burley tobacco production increasing 1.90% in

Table 3. Effects (%) of the AEWR increase on flue-cured tobacco farms under two likely options.

Variable	Option II	Option III
Tobacco price	1.53	0.68
Domestic sales decrease	0.00	-1.00
Export sales decrease	0.00	-2.05
Total production	0.00	-1.65
Marginal cost	1.53	0.92
Revenue	1.53	-0.97

Option II applies to the short-run case where the increase in cost due to the AEWR is passed onto tobacco leaf purchasers; Option III is the case where the increase in cost due to the AEWR is shared between tobacco growers and tobacco leaf purchasers due to the adjustment in production process and purchase plan; The percentage change in tobacco price ($D L_N P$) due to the 5.1% increase in AEWR was determined using Equation (12).

Table 4. Effects (%) of the AEWR increase on burley tobacco farms under two likely options.

Variable	Option II	Option III
Tobacco price	1.90	0.85
Domestic sales decrease	0.00	-1.24
Export sales decrease	0.00	-2.55
Total production	0.00	-2.03
Marginal cost	1.90	1.14
Revenue	1.90	-1.18

Option II applies to the short-run case where the increase in cost due to the AEWR is passed on tobacco leaf purchasers; Option III is the case where the increase in cost due to the AEWR is shared between tobacco growers and tobacco leaf purchasers due to the adjustment in production process and purchase plan; The percentage change in tobacco price ($D L_N P$) due to the 3.8 percent increase in AEWR was determined using Equation (12).

view of a cost share of 50% (0.5 · 3.8). These increases in cost of production are passed onto tobacco leaf purchasers as proportional tobacco price increases. Flue-cured tobacco purchasers would experience a 1.53% price increase while burley tobacco purchasers would experience a 1.90% price increase. Since tobacco leaf purchasers are not expected to respond to the increase in tobacco prices in the short- run, tobacco revenue would increase. However, despite the increase in revenue, in the aggregate, growers are neither better off nor worse off. In other words, the price increase offsets the same percentage increase in production costs, thus creating a welfare-neutral situation.

Option III: Adjustments in the input and output markets

As the methodology that led to the increase in the AEWR was set by regulation, the wage increase is permanent in which case the tobacco leaf price will eventually reflect the increase in cost of production. Obviously, the increase in AEWR leads to an increase in cost of production, which will in turn result in higher tobacco leaf price. However, growers mitigate the higher cost by making some adjustment in input substitution, employing fewer workers or reducing the number of labor hours in their operations. As a result, the increase in cost will get smaller and put less upward pressure on the tobacco leaf price. Also, by reducing their tobacco purchases, tobacco leaf purchasers further mitigate the effect of higher AEWR on tobacco prices.

The increase in AEWR will result in a 0.90% cut in total employment in flue-cured tobacco farms compared to a 0.68% cut in burley tobacco farms. This adjustment in employment will lead to a reduction in the cost of production. The coefficient of adjustment in the input market (θ) is 60% from Equation (5). Therefore, as a result of the adjustment in the production process, the cost of flue-curedproduction is reduced from 1.53% under option II to0.92% (0.6 · 1.53) under option III (Table 3). In short, as a result of the input adjustment, the cost of flue-cured production would only increase 0.92% as opposed to 1.53%. Similarly, the adjustment in burley production process would reduce the rate of increase in costs from 1.90% under option II to 1.14% (0.6 · 1.90) under option III (Table 4). In short, the cost of burley tobacco production would only increase 1.14% as opposed to 1.90%.

Therefore, in the absence of any further adjustment in the output market, flue-cured tobacco leaf purchasers would have to experience a 0.92% increase in price while burley tobacco purchasers would have to experience a 1.14% increase in price. However, since tobacco leaf purchasers had enough time now, they would respond to the price increase and mitigate the increase through reduced purchases. The coefficient of adjustment in the output market (λ) is 74% from Equation (11). The adjustment in flue-cured tobacco leaf purchases would cause the price of flue-cured tobacco to increase by only 0.68% (0.74 · 0.92) (Table 3). Similarly, the adjustment in burley tobacco leaf purchases would cause the price of burley tobacco to increase by only 0.85% (0.74 · 1.14) (Table 4). These prices increases are higher than the case in other industries. Aaronson (1998) shows that a 10% hike in the minimum wage increased restaurant prices on the whole by 0.68% and prices at limited service establishments by 1.6%.

Now putting together the effects of the two adjustments (that is, input adjustment representing 60% reduction and output adjustment representing 74% reduction), the pass-through elasticity is 44% (0.60 · 0.74) from Equation (12). This means that a one-dollar increase in cost of production would result in the price of tobacco increasing $0.44. The 1.53% increase in price of flue-cured tobacco under option II where tobacco purchasers were assumed to absorb the increase in costs in the form of higher price

Table 5. Change in tobacco revenue and producer surplus due to the increase in AEWR.

Variable	Flue-cured				Burley			
	Aggregate ('000,000)		Individual farms		Aggregate ('000,000)		Individual farms	
	Option II	Option III	Option II	Option III	Option II	Option III	Option II	Option III
Actual supply (lb.)	0.00	-8.23	0.00	-3.808	0.00	-4.09	0.00	-645
Actual revenue ($)	13.44	-8.48	6.222	-3.927	6.39	-3.96	1.010	-626
Producer surplus ($)	0.00	-2.05	0.00	-950	0.00	-0.96	0.00	-152

is now reduced to 0.68% (0.44 · 1.53) under option III. Similarly, the 1.90% increase in price of burley tobacco under option II is now reduced to 0.85% (0.44 · 1.90) under option III. Because of these increases, sales of both flue-cured and

burley tobacco would decline. The domestic and export sales of flue-cured would decline by 1.0 and 2.0%, respectively (Table 3). Accounting for the proportion of domestic sales (38%) and export sales (62%), the total production of flue-cured tobacco would decrease by 1.65%. Therefore, given a 0.68% price increase and a 1.65% production decrease, the total flue-cured tobacco revenue would decrease by 0.97% (0.68-1.65).

Similarly, the domestic and export sales of burley tobacco would decline by 1.24 and 2.55%, respectively (Table 4).

Accounting for the proportion of domestic sales (40%) and export sales (60%) given in Table 1, the total production of burley tobacco would decrease by 2.03%. Therefore, given a 0.85% price increase and a 2.03% production decrease, the total burley tobacco revenue would decrease by 1.18% (0.85-2.03).

Change in tobacco revenue and producer surplus

With 499.1 million lbs. of flue-cured tobacco leaf produced in the country in 2008 (Table 1), the cut in flue-cured tobacco leaf supply induced by the 5.1% increase in the AEWR would be 8.23 million lbs. (1.65% · 499.1 million lbs.) (Table 5). Given the flue-cured price of $1.76 per lb., total flue-cured revenue would decline by $8.48 m from its level in 2008.

Further, in the aggregate, flue-cured growers would lose just over $2.0 m in producer surplus. In terms of individual farms, on average each flue-cured farm would cut supply by 3,808 lbs. of tobacco leaf, or reduce tobacco acreage by about 1.5 acre. As a result, each flue-cured tobacco farm would lose about $ 3,927 in gross revenue and about $950 in producer surplus.

In contrast, on average each individual burley tobacco farm would cut supply by 645 lbs. of tobacco leaf, or reduce tobacco acreage by about one-third of an acre. As a result, each burley tobacco farm would lose about $ 626 in gross revenue and about $152 in producer surplus. Other results on burley tobacco are given in Table 5.

CONCLUSION AND IMPLICATIONS

The paper has examined the major cost-increasing element of the 2010 H-2A Final Rule (that is, a change in wage calculation methodology that led to the increase in AEWR) that went into effect on March 15, 2010 and provided estimates of the effect of the additional labor costs on tobacco farms. Results are presented for both short-term and long-term. The short-term effects are presented under two options (I and II) while the long-term effects are presented under option III.

Results presented under option I suggest that in the short-run when neither tobacco growers nor tobacco leaf purchasers are able to make adjustment in their production process and purchase plans, respectively, the increase in cost of production due to the increase in AEWR would be fully absorbed by tobacco growers, creating a profit effect that makes them worse off. In contrast, results of option II suggest that the increase in cost of production due to the increase in AEWR would be fully passed on to tobacco leaf purchasers, creating a welfare-neutral situation.

In the long-run (option III), given the fact that the change in methodologythat led to the increase in the AEWR set by regulation, the increase in wage remains permanent and therefore the additional costs associated with the AEWR prompt both farm employers and tobacco leaf purchasers to make some adjustments in their production process and purchases, respectively. The adjustment made by both tobacco growers and purchasers mitigates the effects of the increase in the AEWR on tobacco price. Results presented under option III indicated that the coefficient of adjustment in the production process is 60% and that in the output market is 74%. Over all, the pass-through elasticity is 44% meaning that a one dollar increase in cost of tobacco production would result in the price of tobacco increasing $0.44. In terms of welfare, flue-cured growers, in the aggregate, would be worse off with a loss of over $2m in producer surplus while burley growers would be worse off with a loss in producer surplus of nearly $1m. On individual basis, flue-cured growers would be much worse off than burley tobacco growers.

Considering the increased prospect of U.S. immigration reform and revision of the current H-2A program, these results provide an insight into the potential effects of

changes in policy and labor regulations affecting wages. Given the importance of labor in tobacco production, unfavorable changes in immigration policy and labor regulations affecting wages could have significant impact on tobacco farms.

REFERENCES

Aaronson D (1998). Price pass-through and the minimum wage:The impact of the minimum wage on prices of food away from home in the U.S. and Canada. Federal Reserve Bank of Chicago.

Brown AB, Martin LL (1996).Price versus quota reductions: U.S. flue-cured tobacco policy. J. Agric. Appl. Econ. 28(2):445–452.

Card D, Krueger AB (1994).Minimum wages and employment: A case study of the fast food industry. Am. Econ. Rev. 84(4):772-793.

Federal Register (2010).Rules and regulations 75:29, Friday, February 12, 2010.

Foreman L, McBride W (2011). Policy reform in the tobacco industry: Producers adapt to a changing market.Economic Research Service/U.S. Department of Agriculture, Economic Information Bulletin 77, May 2011.

Fulginiti LE, Perrin RK (1993).The theory and measurement of producer response under quotas. Rev. Econ. Stat. 75:97-106.

Katz L, Krueger A (1992). The effect of the minimum wage on the fast food Industry. Ind. Lab. Rel. Rev. 46(1):6-21.

Moss C, Livanis G, Schmitz A (2010). The effect of increased energy prices on agriculture: A differential supply approach. J. Agric. Appl. Econ. 42(4):711–718.

NASS/USDA (National Agricultural Statistics Service/ U.S. Department of Agriculture (2008). available at: http://www.nass.usda.gov/Statistics_by_Subject/index.php?sector=CROPS

Neumark D, Schweitzer M, Wascher W (2004). Minimum wage effects throughout the wage distribution. J. Hum. Res. 39(2):425-450.

Neumark D, Wascher W (2006). Minimum wages and employment: A review of evidence from the new minimum wage research. National Bureau of Economic Research, Working Paper no. 12663.

Rezitis AN, Brown BA, Foster WE (1998). Adjustment costs and dynamic factor demand for U.S. cigarette manufacturing. Agric. Econ.18:217-231.

USDOL (United States Department of Labor) (2009). Foreign Labor Certification Report: 2009 Data, Trends and Highlights across Programs and States. Available at: http://www.foreignlaborcert.doleta.gov/pdf/2009_Annual_Report.pdf.