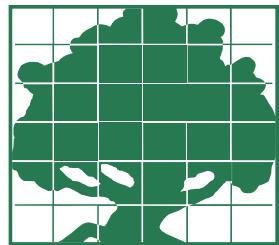


# Agricultural and Resource Economics UPDATE

GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS

• UNIVERSITY OF CALIFORNIA



V. 15 no. 2 • Nov/Dec 2011

## New Free Trade Agreements Will Improve California Farm Export Prospects

by Hyunok Lee and Daniel A. Sumner

The Korea free trade agreement, along with smaller agreements with Colombia and Panama, was negotiated several years ago. However, legislation approving of these agreements finally passed the U.S. Congress and was signed by President Obama only on Oct. 21, 2011. By removing tariffs and other barriers, free trade agreements create larger market opportunities for U.S. farm exports. The potential benefits of the agreement with Korea will be sizable for the United States and California agriculture.

**G**iven the size of the Korean economy and the high trade barriers now being erased, the agreement with Korea is considered the most important U.S. trade agreement since the North American Free Trade Agreement (NAFTA). Throughout this article, we refer to the Republic of Korea simply as Korea; isolationist and communist North Korea is a separate country for which no free trade agreements could be applicable. After a brief overview of U.S. agricultural trade agreements with Panama and Colombia, this article focuses on the Korea-U.S. free trade agreement (KORUS FTA) which is by far the more important agreement for California agriculture.

### U.S. Trade Promotion Agreements with Panama and Colombia

In 2010, the U.S. imported \$53 million worth of agricultural goods from Panama, with three products (cane sugar, bananas and pineapples) accounting for 70% of all imports. The United States exported more than \$450 million in farm goods to Panama—48% of Panamanian agricultural imports. Top U.S. exports were corn, soybean cake and meal, wheat, rice, and horticultural products.

Under the Caribbean Basin Initiative, more than 99% of agricultural imports from Panama enter the U.S. market duty free, but U.S. exports face an average tariff of 15%. Under the agreement, over half of current trade will receive immediate duty-free treatment, and most

remaining tariffs will be eliminated within 15 years.

U.S. agricultural imports from Colombia were almost \$2 billion in 2010. The top U.S. imports include coffee (\$909 million), cut flowers (\$545 million), and fresh fruits. U.S. exports were \$832 million, with grain products leading the list. Currently, agricultural products from Colombia enter the United States under no or minimal tariffs, while U.S. producers face 5% to 20% of tariffs. Under the agreement, 70% of current U.S. farm exports to Colombia will become duty free immediately and the remaining tariffs will be eliminated within 15 years.

### U.S. Farm Exports to Korea

The Korean economy is comprised of about 50 million consumers, with the average per-capita income (about \$25,000) already above that of many European countries and continuing to grow rapidly. Food prices are high, and Koreans pay premiums for perceived safety and quality. Agriculture was central to the KORUS FTA negotiations, and potential gains for the United States center on agricultural exports. The United States is already Korea's top supplier of agricultural products, worth \$3.5 billion in 2007. Despite high tariffs, the U.S. had a 26% share of the Korean agricultural imports in 2007.

Grain products (including soybeans) represented 40% of U.S. farm exports to Korea, followed by fruits, nuts and vegetables (12%), and meat (11%). More

### Also in this issue

#### Immigration Reform: What's Next for Agriculture?

Philip Martin.....5

#### OPEC and the Environmental Impact of Biofuels

Gal Hochman, Deepak Rajagopal, and David Zilberman.....9

recently, the value of grain and meat exports has increased due to higher prices and relaxation of beef barriers that followed finding cases of BSE (mad cow disease) in the United States. The overall U.S. market share has declined, mainly due to the growth of competitors including China, Australia, and Chile.

## California Farm Exports and Korean Markets

Korea ranks among the top six export destinations for California agricultural exports. In 2007, the total value of all California agricultural exports to Korea was almost \$400 million (4% of total California agricultural exports) (Table 1). Among all commodities shipped to Korea, fresh oranges top the list, followed by rice, beef and beef products, almonds, and walnuts.

With their FTA in 2004, Korea's

imports from Chile grew substantially for kiwifruit, grape juice, lemons, processed tomatoes, wine, and whey, which are all major California export products. California's other major international competitors for trade with Korea are France for wine, Spain for grape juice, New Zealand for kiwifruit, beef and dairy, Australia for beef and dairy, Iran for pistachios, and China for strawberries, lettuce, and processed tomatoes (Table 2). Most processed fruit products are imported and little vegetables enter the country.

The potential for increasing California exports to Korea also crucially depends on the competitiveness of Korean producers and the size of the market. Table 2 shows that imports to Korea represent a small share of the domestic consumption of many major food products. Tariffs for most fresh fruits and vegetables are high—above 30% in most cases.

## Opening the Korean Market

The KORUS FTA defines three mechanisms for improving access for farm products: (1) the immediate unrestricted opening, (2) the phase-out of tariffs over a period, and (3) the expansion of tariff-rate quotas (TRQs), with the phase-out of over-quota tariffs. Under a TRQ, a lower tariff is applied to imports within the quota volume, and a higher, often prohibitive (over-quota), tariff is applied to imports in excess of the quota volume. To assure slower import access for politically sensitive products, the agreement allows the imposition of safeguard measures (Tables 3 and 4).

**Citrus.** Korea is a major market for fresh oranges and other citrus from California, despite a current duty of 50%. While the agreement lowers trade barriers considerably during the off-season, in-season imports (Sep. 1 to Feb. 29) will still be subject to tight TRQs. The initial duty-free TRQ of 2,500 tons is equivalent to only 0.4% of Korean citrus produced in Korea in 2007. While not

currently large, Korean demand for fresh grapefruit, lemons, and limes is growing.

**Other fruits and products.** A simple tariff phase-out applies for most fruits, but schedules to open the markets for apples, Asian pears and table grapes, which are consumed widely in Korea, are more restrictive. The initial safeguard quantity for apples is 9,000 metric tons, less than 2.5% of domestic production. Fuji apples, a variety favored by Koreans, have the safeguard duty lasting 23 years. Along with the immediate table grape tariff reduction from 45% to 24%, the tariff for off-season imports (Oct. 16 to Apr. 30) phases out in four years, and the tariff for in-season imports phases out over 17 years. Tariffs for grape juice (45%), raisins (21%), and wine (30%) will be eliminated immediately.

The immediate elimination of the 24% tariff for cherries will expand the fresh cherry market even further. Among other fruits, strawberries and kiwifruit are promising. Currently no fresh strawberries enter the country, and over 70% of strawberry imports are frozen and mainly from China. Kiwifruit is relatively new to Korean consumers, but imports have grown rapidly (mainly from New Zealand).

**Tree nuts.** California tree nuts have a strong presence in the Korean market. Almond and walnut exports are already substantial. Korea has no domestic tree nut industry and the United States (exclusively California) is the only or dominant supplier for tree nuts. The current 8% almond tariff will be eliminated, and in-shell and shelled walnut tariffs, as high as 45%, will be phased out over 6 to 15 years. The immediate elimination of the 30% tariff on pistachios will expand the market.

**Vegetables.** Korean tariffs on vegetables will be eliminated either immediately or phased out over time, except for a few sensitive products for which safeguard restrictions apply. Vegetable exports to Korea are dominated by China, except for

Table 1. Value of California Agricultural Exports to Korea by Commodity, 2007

Commodity	To Korea	To World	Korea Share
---\$millions---			
Total	386.4	10,912	4
Oranges	55.0	260	21
Rice	43.3	313	14
Beef & products	40.5	199	20
Almonds	35.6	1,879	2
Walnuts	35.2	444	8
Dairy products	28.9	963	3
Hay	18.1	134	14
Wine	15.8	816	2
Cotton	13.5	505	3
Tomatoes, proc.	11.3	300	4
Table grapes	10.0	553	2
Cherries	8.5	97	9
Lemons	8.4	169	5
Grape juice	6.7	32	21
Raisins	5.9	213	3
Grapefruit	5.8	79	7
Kiwifruit	2.5	14	18
Plums, dried	2.3	175	1
Pistachios	2.2	364	1
Lettuce	1.8	274	1

Source: Matthews and Sumner, 2008.  
<http://aic.ucdavis.edu/>

No formal trade data available at state level;  
estimates by UC Agricultural Issues Center.

a few commodities such as pickled cucumbers and fresh lettuce.

With a 45% tariff for lettuce, imports constitute a small share of the domestic Korean market valued at \$200 million. California lettuce competes mostly with off-season, high-cost greenhouse lettuce and has substantial potential for export growth under the 10-year tariff phase-out. Other fresh, leafy vegetables also have potential for export growth. Garlic, onions, and red peppers are major crops in Korea and face gradual 18-year phase-outs, with safeguard restrictions.

**Beef and related products.** Beef products are the number-one agricultural import into Korea by value, exceeding \$1 billion in 2007. Korea became an important market for U.S. beef after its beef market was opened in 2001. However, a ban on U.S. beef was imposed in December 2003 (following the BSE incident) and Australia and New Zealand exports expanded rapidly. The U.S. market share has been improving gradually since the U.S. resumed export to Korea in 2007.

Under the KORUS FTA, with the sizable initial safeguard quantity, the within-quota tariff is scheduled to fall by 2.7% each year, providing a price advantage to U.S. producers over their competitors.

**Dairy products.** Korea currently has high trade barriers for dairy products. Under the KORUS FTA, TRQs increase gradually with the phase-out of over-quota tariffs. Among dairy products exported to Korea, the U.S. has a strong presence in cheese, lactose, and whey.

Under the agreement, the first year duty-free TRQ for cheese is sizable (close to the total U.S. cheese exports to Korea in 2007). For feed whey, immediate duty-free access is granted and for non-feed whey, the over-quota tariff (over 3,000 metric tons) will be reduced immediately from 49.5% to 20%—phased out over ten years. U.S. exports of lactose to Korea are also sizable, worth \$30 million, about half of

Table 2. Value of Korean Imports and Major Competitors for Selected Commodities, 2007

	Korean Imports (\$mil)	U.S. % of Korean Imports	Import % of Korean Consumption*	Major Competitors' % of Korean Imports
<b>FRUIT</b>	852	27	n/a†	Philippines(30), China(9), Chile(7), NZ(7)
Bananas	171	0	100	Philippines (100)
Oranges, fresh	108	93‡	9.9	—§
Oranges, juice	71	24	100	Brazil (60)
Kiwifruit, fresh	70	8	100	NZ (77), Chile (14)
Pineapples	68	0	100	Philippines (98)
Table grapes	58	18	8.3	Chile (82)
Cherries, all	36	91	100	—
Grape juice	25	47	100	Spain (26)
Lemons	11	77	100	Chile (5), Italy (10)
Apples, proc.	10	0	100	China (50), Chile (2)
Strawberries, froz. & proc.	10	26	3.7	China (57), Mexico (5)
Peaches, proc.	9	0	100	China (44), S. Africa (20), Greece (14)
Grapefruit, juice	9	74	100	Japan (12)
Raisins	6	98	100	—
Olives	3	1	1	Spain (75), Italy (18)
Prunes, dried	2	98	n/a	—
Peaches, juice	1	83	100	China (8)
Pears, proc.	0.3	1	100	China (48), Spain (18), S. Africa (12)
Pears, fresh	0.1	83	0	—
<b>VEGETABLES</b>	466	14	11	China (69), Japan (4), NZ (3)
Red peppers	85	0	15	China (95)
Carrots	37	0	n/a	China (98)
Tomatoes, proc.	36	32	100	China (42), Chile (10), Italy (9)
Garlic	32	0	12.8	China (100)
Pumpkins	15	0	n/a	NZ (88)
Onions	13	6	3	China (94)
Broccoli	11	0	n/a	China (100)
Cucumbers	9	47	n/a	China (41)
Lettuce	4	48	n/a	China (52)
<b>TREE NUTS</b>	76	94	93	—
Walnuts	38	91	100	Vietnam (9)
Almonds	35	100	100	—
Pistachios	3	59	100	Iran (37)
<b>BEEF, DAIRY</b>	1,856	28	n/a	Australia (45), NZ (15)
Beef	1,037	9	59	Australia (73), NZ (16)
Dairy, all	438	19	n/a	NZ (24), Australia (15)
Hides, skins	381	89	n/a	—
<b>OTHER</b>				
Cotton	305	40	100	Australia (13)
Hay	237	82	n/a	—
Wine	150	11	n/a	France (45), Chile (15)
Rice	137	31	5.4	China (61), Thailand (8)
Flowers	68	1	n/a	China(31), Taiwan(30), Netherlands(18)

Sources: Korea Agricultural Trade Information 2009; Korean Ministry of Agr., Forestry, Fishery and Food, 2008.

\*Some shares are based on quantity when values are unavailable.

†No domestic production statistics available or commodity aggregation is not meaningful (e.g., dairy products).

‡Discrepancy between Korean and U.S. sources; U.S. figure was \$85.4 million.

§No major competitors.

**Table 3. Access Improvement for Important Agricultural Products by General Market Access Category upon Implementation of KORUS FTA, 2007**

**1. Immediate Unrestricted Opening:** asparagus, cabbage, celery, cucumbers, eggplants, shallots, spinach (fresh and frozen), tomato paste, cherries, olives, raisins, frozen orange concentrate, grape juice, wine, almonds, pistachios, coffee, cattle hides and skin, live livestock, feed whey

**2. Tariff Phase-Out:**

Years to Complete	Product
2	Avocados, lemons, dried plums
5	Chinese cabbage, carrots (fresh and frozen), cauliflower, broccoli, peas, beans*, dried mushrooms*, tomato juice, grapefruit, strawberries (frozen), orange juice, various fruit juices
4	Off-season table grapes
6	Walnuts (shelled), off-season fresh oranges
7	Tomatoes, ice cream, apricots
9	Strawberries
10	Artichokes, Brussels sprouts, preserved cucumbers, lettuce, fresh mushrooms*, peaches, pears (excluding Asian pears), dates, persimmons, tangerine juice
12	Chicken meat, frozen onions, watermelon, various berries
15	Korean citrus, kiwifruit, walnuts (in shell), chestnuts, pinenuts, oak mushrooms (fresh and dried), beef offal
17	In-season table grapes
20	Asian pears

**3. Duty-Free Tariff Rate Quota Expansion with or without Over-Quota Tariff Phase-Out:** in-season fresh oranges, many dairy products

**4. Safeguard Quantity and Duty:** garlic, onions, peppers, beans, sweet potatoes, ginger, apples, beef, pork

**Excluded from Agreement:** Rice (remained at the quota set by 1994 WTO agreement)

Source: Office of United States Trade Representative (USTR), 2008. \*Some varieties excluded.

**Table 4. Base Tariffs on Exports to Korea for Selected Products**

Base Tariff %	Product
1	Cattle hides and skin
8	Almonds(shelled and in shell)
	Tomatoes (paste)
18–20	Plums (dried), olive, casein
21–24	Raisins, cherries (fresh)
27–30	Artichokes, Chinese cabbage, broccoli, cauliflower, brussels sprouts, garlic (frozen & pickled), peppers (frozen), onions (frozen), cucumbers (pickled), carrots (fresh, frozen, preserved & dried), beef offal, lemons and limes, grapefruit (fresh & juice), wine, avocados, dates, pistachios, walnuts (shelled)
36–40	Cheese
	Beef (muscle cuts)
45–50	Apricots, cherries (canned), peaches, strawberries, other berries, oranges, peaches (preserved), juices (grape, apple, lemon, lime, peach, strawberry), walnuts (in shell), lettuce, tomatoes, lactose, whey
54	Orange juice (frozen concentrate)
89	Butter
135*	Onions (fresh and dried)
144	Korean citrus and mandarins
176	Skim and whole milk power
270	Peppers (fresh and dried)
360*	Garlic (fresh and dried)

Source: USTR 2008.

\*Over-quota tariffs; base tariffs are 50%, but quotas are so tiny that higher tariffs are listed.

Korean lactose imports, and the current tariff of 49.5% will be phased out in five years under the agreement.

## Opportunities Ahead

Although Korea already has an almost open border for many field crops—with the important exception of rice—it has high trade barriers for many vegetables, fruits, and animal products that are important in California agriculture. Under the KORUS FTA, California has substantial potential to expand its exports of agricultural commodities to Korea. Lower trade barriers will allow California agriculture to compete in a large, growing, and lucrative market.

Commodity prices are high in Korea, and consumers are willing to pay premiums for the high-quality products produced in California. When the KORUS FTA is implemented, California agriculture should be in an excellent position to compete on both price and quality.

Suggested Citation:

Lee, H. and D.A. Sumner. 2011. "New Free Trade Agreements Will Improve California Farm Export Prospects." ARE Update 15(2):1-4. University of California Giannini Foundation of Agricultural Economics.

Hyunok Lee is a research economist and Daniel Sumner is the Frank H. Buck, Jr. Chair in Agricultural Economics, both in the ARE department at UC Davis. They can be reached by e-mail at [hyunok@primal.ucdavis.edu](mailto:hyunok@primal.ucdavis.edu) and [dasumner@ucdavis.edu](mailto:dasumner@ucdavis.edu), respectively.

## For additional information, the authors recommend:

Lee, H. and D.A. Sumner *The Prospective Free Trade Agreement with Korea: Background, Analysis, and Perspectives for California Agriculture*. June 2009. UC Giannini Foundation of Agricultural Economics Information Series 09-2. [http://giannini.ucop.edu/InfoSeries/092\\_KORUS\\_FTA.pdf](http://giannini.ucop.edu/InfoSeries/092_KORUS_FTA.pdf).

For information on free-trade agreements, visit the USDA website: [www.fas.usda.gov/info/](http://www.fas.usda.gov/info/)

# Immigration Reform: What's Next for Agriculture?

Philip Martin

About 5% of U.S. workers, and over 50% of the workers employed on U.S. crop farms are unauthorized. This article explains how immigration reforms in the past increased the availability of unauthorized farm workers, allowing employers to become complacent about farm labor. However, federal government audits of employers, and more states requiring employers to use the federal E-Verify database to check the legal status of new hires, have increased worries about the cost and availability of farm workers.



Producing specialty crops, such as pears pictured above, involves large numbers of immigrant farm workers to fill seasonal jobs.

Farm labor was a major concern of agriculture in the early 1980s when enforcement of immigration laws involved the Border Patrol driving into fields and attempting to apprehend workers who ran away. Apprehended migrants were normally returned to Mexico, and many made their way back to the farms on which they were employed within days. There were no fines on employers who knowingly hired unauthorized workers, and the major enforcement risk was loss of production until unauthorized workers returned. As a result, perishable crops, such as citrus, that were picked largely by labor contractor crews included more unauthorized workers than lettuce crews that included workers hired directly by large growers.

The Immigration Reform and Control Act (IRCA) of 1986 imposed federal sanctions on employers who knowingly hired unauthorized workers. In order to avoid fines and criminal sanctions, all newly hired workers must present documents to their employers to establish their identity and right to work. The employer and worker complete and sign an I-9 form attesting that the worker presented and

the employer saw work-identification documents. Employers are not required to determine the authenticity of the documents presented by workers.

There were two legalization programs in 1987–88 that allowed 2.7 million unauthorized foreigners, 85% of whom were Mexicans, to become legal immigrants. The nonfarm program legalized 1.6 million unauthorized foreigners who had been in the United States since January 1, 1982, while the Special Agricultural Worker (SAW) program legalized 1.1 million unauthorized foreigners.

Unauthorized workers continued to arrive in the early 1990s and presented false documents to get hired, that is, forged documents or documents that belonged to work-authorized persons. As a result, employers faced less risk of disrupted production because the paper chase involved in checking whether documents were genuine did not immediately remove unauthorized workers from the workplace as had Border Patrol worker chases.

Figure 1 shows that newly legalized SAW farm workers were one-third of the crop work force in the early 1990s, but found nonfarm jobs

Figure 1. SAWs Down, Unauthorized Up

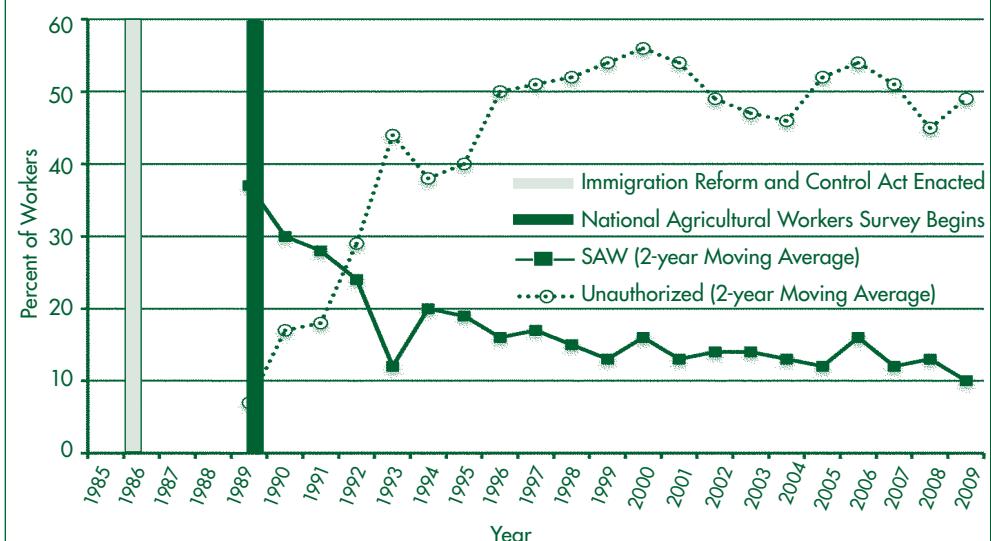
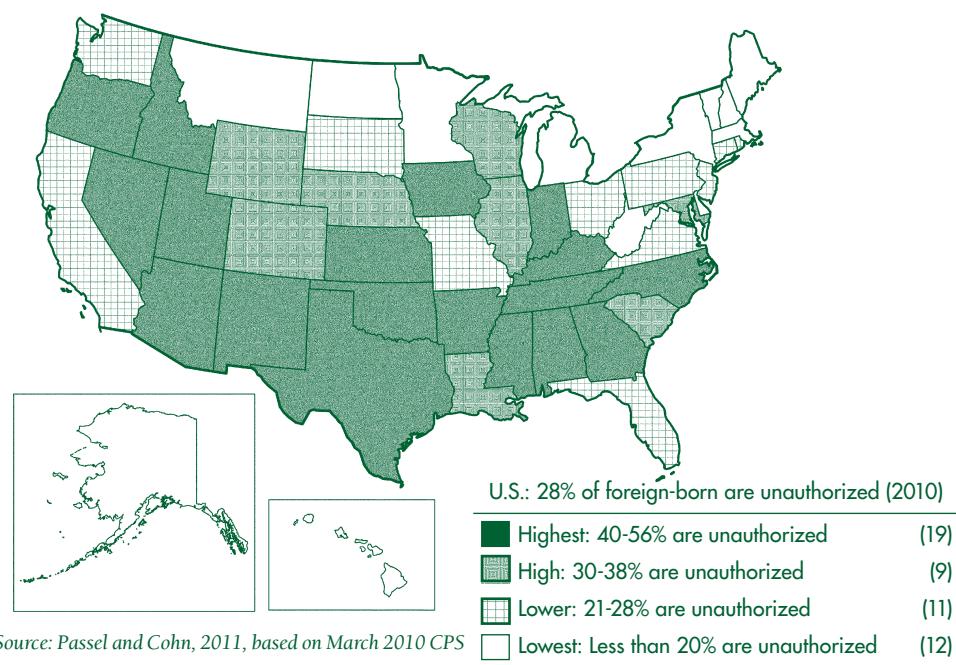


Figure 2. Unauthorized Share of Foreign-Born Residents by State



as the economy improved in the mid-1990s. The U.S. Department of Labor's National Agricultural Worker Survey first found that over half of the workers employed on U.S. crop farms were unauthorized in 1995, and the share of unauthorized crop workers has remained at about half since then.

### Federal E-Verify and I-9 Audits

In 1996 Congress required the then Immigration and Naturalization Service to develop programs to check the validity of worker documents. These programs evolved into E-Verify, the current Internet-based system that employers used to check on the legal status of almost 16 million new hires in fiscal year (FY) 2010, about 30% of the 50 million to 60 million new hires made each year in the United States.

Employers submit Social Security numbers and immigration data to E-Verify, and over 98% of their inquiries result in workers being confirmed as work-authorized in less than five seconds. Employees with "tentative nonconfirmations" are given a written notice advising them to correct their records so that E-Verify shows them to be authorized to work. Over

80% of tentative nonconfirmations result in the employee quitting, likely because the worker was unauthorized.

At the end of 2011, all federal contractors and 18 states required some or all of their employers to use E-Verify to check new hires. The U.S. Supreme Court upheld Arizona's Legal Arizona Workers Act in May 2011, which requires all of Arizona's employers to participate in E-Verify. Most major meatpackers have been using E-Verify for at least a decade. The House Judiciary Committee approved the Legal Workforce Act (LWA)(HR 2164) in September 2011 to require all U.S. employers to use E-Verify to check new hires and/or job applicants within four years.

Today the federal government enforces laws against hiring unauthorized workers by auditing the I-9 forms completed by newly hired workers and their employers. Most workers identified as having problematic documentation quit or are terminated, prompting denunciations of so-called "silent raids" aimed at unauthorized workers. Some employers, such as L. E. Cooke in Visalia, complain that I-9 audits require them to terminate

experienced employees who are difficult to replace. Gebbers Farms in Washington fired hundreds of workers after an I-9 audit and replaced them with legal H-2A guest workers.

### State Laws

With Congress deadlocked on immigration, states such as Arizona enacted laws to reduce the number of unauthorized foreigners in an "attrition through enforcement" strategy. Arizona enacted the Support Our Law Enforcement and Safe Neighborhoods Act (SB 1070) in April 2010—a law that requires everyone to carry proof of their legal status and show this proof to police officers who stop them for other reasons. Unauthorized foreigners detected by police can be fined \$2,500 or jailed up to six months.

The Obama administration asked a federal court to block implementation of SB 1070, arguing that federal immigration law prevents Arizona from enacting a state law that interferes with federal immigration enforcement priorities and could lead to the arrest of U.S. citizens and foreigners lawfully in the United States who are not carrying proof of their legal status.

A federal judge agreed and issued an injunction blocking implementation of the key provisions of SB 1070. However, a Pew poll in May 2010 found 59% support for SB 1070, including two-thirds who support requiring people to present proof of legal status to police if asked.

Arizona and other states that enacted attrition-through-enforcement immigration laws have mostly unauthorized foreign-born residents. Figure 2 shows that a band of states that trace a U-shape, from Idaho through the southern states to North Carolina, has the highest share of unauthorized foreigners among foreign-born residents in the state. About 28% of foreign-born persons in the United States in 2010 were unauthorized, but 40% or more

Table 1. Average Annual Employment on Crop Farms, 2001–2010

Year	U.S. Crop Farms	CA Crop Farms	U.S. Support	CA Support	Total U.S.	Total CA
2001	563,580	189,192	274,652	156,136	838,232	345,328
2002	555,075	186,335	266,888	151,334	821,963	337,669
2003	555,926	184,247	270,101	156,615	826,027	340,862
2004	555,437	178,844	268,106	153,778	823,543	332,622
2005	548,715	177,003	280,336	166,012	829,051	343,015
2006	540,682	172,267	283,589	169,717	824,271	341,984
2007	538,528	172,222	287,457	175,985	825,985	348,207
2008	536,507	174,697	290,855	178,862	827,362	353,559
2009	531,096	170,041	279,642	166,885	810,738	336,926
2010	528,867	170,068	287,480	177,168	816,347	347,236
2009-10 -2001-02	-46,703	-27,271	19,205	28,808	-27,498	1,537
% Change	-6%	-11%	5%	11%	-2%	0%

Source: Quarterly Census of Employment and Wages

of the foreign-born residents in states such as Arizona, Alabama, and Georgia that enacted laws against illegal migration in 2011 are unauthorized.

Alabama's HB 56 is considered the "toughest" state law against unauthorized foreigners, with Arizona-style police and E-Verify requirements. This law also voids contracts entered into by unauthorized foreigners, makes it unlawful to hire or rent to unauthorized foreigners, and requires schools to obtain and report data on the legal status of school children and their parents (but not turn away unauthorized children). Suits have blocked the implementation of parts of HB 56, but some unauthorized foreigners left the state, prompting complaints of labor shortages.

The U.S. Department of Homeland Security (DHS) deports about 400,000 unauthorized foreigners a year. The main target of internal enforcement efforts are foreigners who committed U.S. crimes, but DHS agents take into custody other unauthorized foreigners they encounter when searching for criminals. Under

the Secure Communities program, state and local police share the fingerprints of persons they arrest with DHS, which can ask police to hold suspected unauthorized foreigners.

### Legal Guest Workers

If federal enforcement and state laws reduce the availability of unauthorized farm workers, can farmers hire legal guest workers? The H-2A program allows farmers to request certification from the U.S. Department of Labor (DOL) to employ legal guest workers. DOL certified over 95% of employer requests for H-2A workers within 45 days, allowing over 7,000 farm employers to fill almost 95,000 jobs with H-2A workers in 2010. In some cases, one H-2A worker fills more than one U.S. farm job in the United States; the number of visas issued to H-2A workers averages 55,000 a year.

In order to be certified to employ H-2A workers, farm employers must try to recruit U.S. workers by posting the job with a State Workforce Agency and advertising it in local media. Employers record the reasons why the U.S.

workers who responded to the job offer were not hired. In many cases, U.S. workers seeking farm jobs want to go to work right away, not 30 days in the future, so many U.S. workers who are hired do not show up when the employer calls them to go to work.

Employers must offer the higher of the federal or state minimum wage, the prevailing wage in the area, or the adverse effect wage rate (AEWR)—the average hourly earnings of crop and livestock workers reported by farm employers to USDA's NASS during the previous year. The AEWR, which ranges from \$9 to \$12 an hour, is usually the highest of the three wages.

In addition to offering the higher-than-minimum wage AEWR, farmers seeking DOL certification to employ H-2A workers must offer free and approved housing to out-of-area U.S. workers and H-2A workers. This housing requirement is difficult to satisfy in California and other states where labor-intensive farming occurs largely in metro counties. Most farmers in such areas do not offer housing to their employees, and zoning laws make it hard to construct new farm worker housing.

Requirements for supervised recruitment, the AEWR, and providing housing for workers convinced many farmers, especially in California, that the H-2A program is "unworkable." Farmers supported bills in Congress during the 1990s that would have created alternative guest worker programs that eliminated the search for U.S. workers, reduced the AEWR, and eliminated the housing requirement.

These guest worker bills were not enacted. However, in December 2000, after the elections of Presidents Fox and Bush, both of whom embraced legalization for unauthorized workers and new guest worker programs, farm worker advocates and farm employers negotiated the Agricultural Job Opportunity Benefits and Security Act (AgJOBS).

AgJOBS would legalize unauthorized foreigners who have done farm work, and make it easier for farm employers to hire guest workers under the H-2A program, repeating the legalization and guest worker changes of IRCA in 1986.

## The Road Ahead

AgJOBS was not enacted despite bipartisan support. Instead, Republicans in Congress and states introduced bills and enacted laws that use an enforcement-first strategy to deal with unauthorized migration. As Table 1 shows, more crop farmers in California and throughout the U.S. have turned to labor contractors to obtain workers; employment has been stable, but an increasing share of workers are brought to farms by labor contractors and other intermediaries who are willing to act as risk absorbers in the event of labor and immigration law enforcement. However, stepped-up enforcement of current laws without a new or revised guest worker program could leave agriculture with too few workers.

Republicans in Congress who want to increase enforcement are trying to deal with labor shortage concerns by making it easier for farmers to hire legal guest workers under new programs. The American Specialty Agriculture Act (HR 2847) would retain the current H-2A program and provide up to 500,000 new H-2C visas a year to foreign farm workers who could stay in the United States up to 10 months a year. To hire H-2C workers, farmers could simply attest that they are abiding by program regulations rather than engage in supervised recruitment, and they could give H-2C workers housing vouchers rather than provide them with housing. H-2C workers could be paid the higher of the federal or state minimum wage or the prevailing wage rather than the AEWR.

The second approach to make it easier for farmers to hire legal guest workers is the Legal Agricultural

Workforce Act (HR 2895), which would grant an unlimited number of 10-month W-visas to foreigners who could move from one farm employer to another. Farm employers certified by USDA to hire W-visa workers would pay Social Security and the Federal Unemployment Insurance taxes on the wages of W-visa workers to cover the cost of administering the program. W-visa workers would pay for their own transportation and housing in the United States, but would receive a refund of their Social Security contributions as an incentive to return home.

None of the bills mandating E-Verify or creating new guest worker programs is likely to be enacted in 2012. This means that a major farm labor challenge arises from the effects of long-time federal and new state enforcement efforts. For example, fences and vehicle barriers have been erected on one-third of the 2,000 mile Mexico-U.S. border, slowing the influx of unauthorized Mexicans and other foreigners; only 375,000 were apprehended in FY2011—down from 1.2 million in FY2006. Deportations of foreigners, almost 400,000 in FY2011, exceeded the number of foreigners apprehended just inside U.S. borders for the first time.

Fewer new entrants means fewer new farm workers, since many rural Mexicans find their first U.S. job in agriculture. If states require employers to check new hires with E-Verify, and if state and local police detain the persons they encounter who do not have proof of their legal status, farm employers may find fewer new workers appearing to replace those who move on to nonfarm jobs.

## What Is Next?

Agriculture is at another farm labor crossroads. The question is whether the next few years will turn out to be like the mid-1960s, when the end of the Bracero program ushered in a 15-year era of rapidly rising wages,

mechanization, and union activities. Or will the coming years be more like the late 1980s, when legalization, continued unauthorized migration, and the spread of labor contractors, custom harvesters, and other intermediaries negated the effects of federal employer sanctions laws, allowing the employment of unauthorized workers to increase.

Farmers are reacting to the Congressional stalemate on immigration and new enforcement efforts in different ways. Some are constructing housing for farm workers and beginning to hire workers under the current H-2A program, reasoning that investments in foreign worker recruitment and housing will provide legal and stable workers. Others hope to persuade Congress and state legislatures to exempt agriculture from new immigration enforcement efforts and create new guest worker programs.

### Suggested Citation:

Martin, Philip L. 2011. "Immigration Reform and Agriculture." *ARE Update* 15(2):5-8. University of California Giannini Foundation of Agricultural Economics.

Philip Martin is a professor in the Department of Agricultural and Resource Economics at UC Davis. He can be reached by e-mail at martin@primal.ucdavis.edu.

### For additional information, the author recommends:

Mines, Richard and Philip L. Martin. 1983. Foreign Workers in Selected California Crops. *California Agriculture* 37, 3-4 (March): 6-8.

Martin, Philip and Linda Calvin. 2010. Immigration Reform: What Does It Mean for Agriculture and Rural America? *Applied Economic Perspectives and Policy* 32(2): 232-253.

Rural Migration News. Quarterly. <http://migration.ucdavis.edu/rmn/>

# OPEC and the Environmental Impact of Biofuels

**Gal Hochman, Deepak Rajagopal, and David Zilberman**

Much attention has been given to the introduction of biofuels assuming competitive oil markets. This paper argues that OPEC behaves as a cartel of nations and that this suggests different outcomes than those derived under the competitive or the standard cartel models. In particular, the paper shows that the competitive model overestimates the price effect of the introduction of biofuels but underestimates the quantity effect and, thus, the impact of the introduction of biofuels on the environment.

**C**oncerns about the high price of oil, energy security, and balance of trade, combined with the desire to reduce greenhouse-gas (GHG) emissions and enhance rural development, led to a wide array of policies supporting biofuel production in the United States and the European Union (EU). These included the American Clean Energy and Security Act of 2009 as well as the consumption of biofuels as part of renewable fuel policies, such as the California and the EU renewable fuel standards.

A large body of literature analyzed the impacts of these policies on fuel and food markets and their optimality. However, some of the studies analyzing the impacts of biofuel on the fuel markets assume that they are competitive without special attention to the behavior of the Organization for Petroleum Exporting Countries (OPEC) and their impacts. In this paper we present the results of research that aim to model OPEC's behavior and how OPEC's behavior will affect the price impact of biofuel on fuel prices and GHG emissions.

## Oil Revenue and Fuel Prices

In the 1960s, OPEC was founded to unify and coordinate members'

petroleum policies. Currently, it has 12 members, including major oil producers, such as Saudi Arabia, Iran, Iraq, Venezuela, and Nigeria, which control more than 50% of the known oil reserve and produce 42% of the crude-oil production. The organization uses its market power to control production and pricing of oil with varying degrees of effectiveness.

Figure 1 depicts OPEC's revenues through 2008 and suggests that OPEC members' revenues peaked in the late 1970s and in the new millennium. The increase in oil revenues in the new millennium was a result of an increase in global demand for crude oil from 2000 to 2008, associated with a slow increase in supplies, which led to a rapid increase in the price of crude oil during the same period.

Although prices more than quadrupled, OPEC production during 1998–2010 increased by an average of only 0.6% a year and the exports grew by only 0.2% a year. The slow growth in production may reflect either slow expansion of supply or more discipline exercised by the cartel members.

Some of the revenue of OPEC countries has been allocated to subsidize fuel prices domestically, as consumers of gasoline and diesel in OPEC countries pay significantly lower prices at

the pump compared to the rest of the world. In 2006 average super gasoline prices in non-OPEC countries were 1.04 USD per liter, including an average base retail price of 0.63 USD per liter and extra domestic fees of 0.41 USD per liter, whereas in OPEC countries they averaged only 0.28 USD, which reflects a subsidy of 0.35 USD per liter.

We computed the subsidy or tax equivalent levied on gasoline at the fuel pump compared to a benchmark export gasoline price, and the results are depicted in Figure 2. The figure illustrates the widening of the gap between gasoline prices in the oil-importing countries and OPEC countries in the new millennium. During this period, nominal gasoline subsidies in OPEC countries increased while crude-oil prices grew by more than 500% and gasoline prices in the rest of the world surged.

Another perspective of fuel pricing is presented in Figure 3. It depicts average gasoline and diesel prices in both OPEC countries and in the rest of the world. From 1993 to 2000, the gap between prices in OPEC countries and the rest of the world was stable but, after 2000, the gap began to grow at an increasing rate as OPEC intensified the utilization of its monopoly power.

Figure 1. OPEC Oil-Export Revenues and West Texas Intermediate Price, 1975–2007

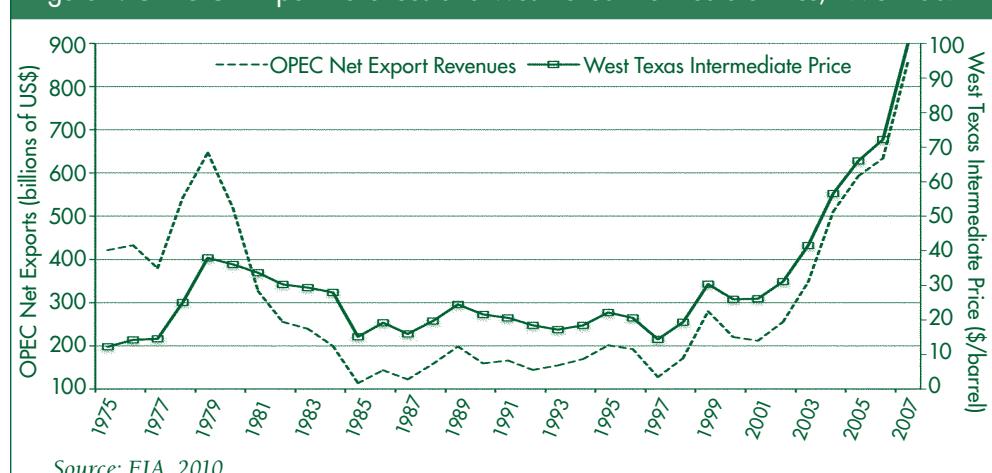
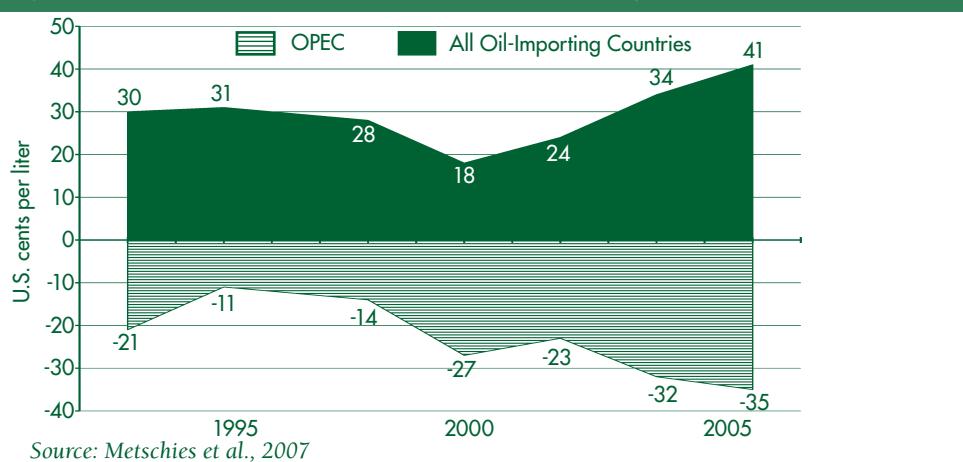


Figure 2. Subsidies or Taxes Levied on Gasoline Consumption



## Explaining the Pricing of Crude Oil and Transportation Fuels

The pricing patterns presented above suggest that OPEC countries exercise their market power so that the outcomes of crude-oil and transport-fuel markets deviate from the competitive outcome. Under this equilibrium, output is determined by equating supply and demand and the price is equal to the marginal cost of production—the cost of producing the marginal (most expensive) unit sold.

Several studies model OPEC as if it were a cartel of firms and suggest that it sets prices to maximize profits for its members so that the quantity sold is below the competitive level and the price is above the competitive price and the marginal cost of production. However, a monopolistic firm will not subsidize a group of consumers as OPEC does. So we model OPEC as a cartel of nations.

Such cartels are run by politicians who consider the gains of producers (technically, producers' surplus) from profits (both in the domestic and international market), and the gains of consumers (consumers' surplus) from the gap between the benefits of fuel and the price paid for it. Therefore, a cartel of nations will charge consumers in an importing nation a profit-maximizing monopoly price while subsidizing the domestic consumers. The subsidy

depends on the relative weight given to producers' versus the consumers' surplus. Our empirical analysis suggests that, on average, equal weight is given to the welfare of the two groups but there are differences in the subsidizations among countries (see Table 1).

The fuel subsidies are “cheap fuel” policies used by the government to buy political support. They are akin to the widely used “cheap food” policies but, unlike cheap food policies that aim to placate the poor, the cheap fuel policies are targeted to buy the good will of the middle class. Countries may provide more subsidies if the political accommodations that they buy are especially valuable. Indeed, Table 1 suggests that subsidies are more likely to occur in countries with a major reserve or in authoritarian countries, such as Iran or Venezuela.

## OPEC and Biofuels

This research aims to explain the impact of the introduction of biofuels on fuel markets while introducing OPEC into the analysis. This work evaluates the impact of biofuels on fuel markets while incorporating OPEC into the analysis and assessing the effect of the introduction of biofuels on the international price of oil, the price of gasoline inside as well as outside of OPEC countries, and the global GHG emissions.

This is done while making three alternative assumptions on the international oil markets: Markets are

competitive, OPEC is a cartel of firms that maximizes profit, and OPEC is a cartel of nations that maximizes economic surplus from oil production and domestic consumption.

Using data from 2007 while considering quantities of both ethanol and biodiesel consumed that year (approximately 16 billion gallons), we developed a model that is used to synchronize outcomes among gasoline, diesel, and crude-oil markets—a challenge given that we only have partial data for each of the markets.

A key parameter that affects the outcome of the analysis is how responsive the demand of oil from OPEC in the oil-importing countries is to changes in fuel prices. Less responsive (less elastic) demand means that, when price increases, there is less reduction in consumption or, inversely, that prices go up further for a given decline in fuel demanded. We use four parameters from -1.25 (least elastic) to -2.0 (most elastic).

The introduction of biofuels is estimated to have increased fuel subsidies

Table 1. The Gap Between Domestic and International Prices Varies Among OPEC Countries

Country	Domestic Price cents/liter	Gap
Venezuela	2	62
Iran	3	61
Saudi Arabia	7	57
Libya	13	50
Algeria	19	44
Qatar	19	44
Kuwait	21	42
Angola	36	27
Indonesia	44	19
UAE	53	10
Nigeria	66	-3
Iraq	NA	NA

Note: The gap equals the international price minus the domestic price of fuel in an OPEC country using 2006 data. The international price of 0.63 USD per liter equals the retail price of gasoline in the United States minus 0.10 USD for two road funds (federal and state). Because there are no other specific fuel taxes, this price can be considered as the international price of fuel.

in OPEC countries in 2007 by 2%–3% and reduced world fuel prices by 2%. The introduction of biofuels caused the import demand of oil from OPEC countries to decline, leading to a decline in fuel prices. Then, OPEC responded by reducing exports so that the supply of oil available to oil importers would decline, which would contribute to increased fuel prices in the oil-importing countries.

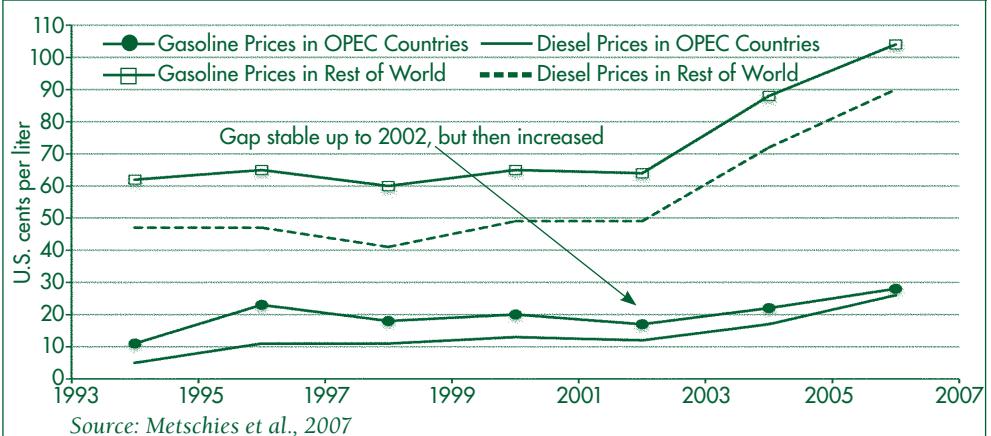
Some of the oil that was withdrawn from the oil-importing countries went directly to OPEC's domestic consumers. Thus, OPEC mitigated the loss in profits due to the introduction of biofuels by redistributing benefits from the introduction of biofuels to its domestic constituencies.

The introduction of biofuels caused consumption of gasoline and diesel in 2007 to decline by about three billion gallons a year, which is about 2.5% of total consumption. However, the decline in fuel prices resulted in an increase in total fuel consumed (including biofuels). This increase in overall fuel consumption because of a lower price is called the “rebound effect.” For the range of elasticities investigated, we show a rebound effect of about nine billion gallons a year. The rebound effect may lead to an increase in overall GHG emissions with biofuels.

While biofuels may emit less GHGs per unit of energy, the larger volume of fuel consumption may lead to a larger volume of GHG emissions. Using the cartel of nations model, we show that there is potential for GHG emission savings with the introduction of advanced biofuels, such as cellulosic biofuels.

The model used to characterize the energy market affects estimates of the biofuel effects on consumption and production as well as on fuel prices and GHG emissions. Competition overestimates the price effect but underestimates both quantity and environmental effects associated with the introduction of biofuels (e.g., the environmental effect is underestimated

**Figure 3. Gasoline and Diesel Prices Inside and Outside of OPEC Countries**



Source: Mettschies et al., 2007

by about 40%). Our analysis also shows that modeling the oil market as either competitive or with a cartel of nations overestimates the monetary benefits of the introduction of biofuels to oil-importing countries but underestimates the costs to oil-exporting countries.

## Discussion and Concluding Remarks

The analysis suggests that the introduction of alternatives to crude oil (e.g., shale gas and biofuels) will reduce fuel prices and crude-oil production but increase overall fuel consumption. The GHG emissions will decline if the alternatives to conventional fossil fuels are relatively clean but, for most commercially used biofuels, total GHG emissions will increase.

The introduction of biofuels affects OPEC pricing behavior: OPEC mitigates the reduction in oil revenues due to the introduction of biofuels by increasing domestic fuel consumption but reducing exports more than implied by the introduction of biofuels under the competitive model. Thus, when assessing the impact of biofuels, the outcomes under a cartel of nations model are different than those under competition.

Although the introduction of biofuels leads to a reduction of fuel prices in oil-importing countries, this reduction is smaller than the reduction computed under competition, suggesting that the estimated gain from biofuels to the consumers in the oil-importing

countries under a cartel of nations is smaller than under competition (the decline in prices is smaller under a cartel of nations). However, when compared to the competitive model, the cartel of nations predicts a larger reduction in exports and, thus, a larger reduction in foreign exchange. That is, the impact of biofuels on GHGs under the cartel of nations is relatively more positive than predicted by the competitive behavior.

Theory and empirical analyses suggest that assessment of the impact of alternatives to crude oil require better quantitative modeling of the oil markets, including OPEC. They suggest that further empirical work, especially econometric analysis of OPEC pricing behavior, is needed to further support and expand this line of research and to improve our understanding of the international oil markets.

### Suggested Citation:

Hochman, G., D. Rajagopal, and D. Zilberman. 2011. "OPEC and the Environmental Impact of Biofuels." *ARE Update* 15(2):9-11. University of California Giannini Foundation of Agricultural Economics.

Gal Hochman is an associate professor in the agricultural food and resource economics department at Rutgers University. Deepak Rajagopal is an assistant professor in the Institute of the Environment and Sustainability at UCLA, and David Zilberman is a professor in the ARE department at UC Berkeley. They can be reached by e-mail at hochman@AESOP.Rutgers.edu, rdeepak@ioes.ucla.edu, and zilber11@berkeley.edu, respectively.

Department of Agricultural and Resource Economics  
UC Davis  
One Shields Avenue  
Davis CA 95616  
GPBS

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**Agricultural and  
Resource Economics  
UPDATE**

**Co-Editors**

Steve Blank  
Richard Sexton  
Sofia Berto Villas-Boas  
David Zilberman

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and Desktop Publisher**

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**Published by the  
Giannini Foundation of  
Agricultural Economics**



<http://giannini.ucop.edu>

**ARE Update** is published six times per year by the Giannini Foundation of Agricultural Economics, University of California.

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Julie McNamara, Outreach Coordinator  
Giannini Foundation of Agricultural Economics  
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One Shields Avenue, Davis, CA 95616  
E-mail: julie@primal.ucdavis.edu  
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