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A Comparison of Agricultural Input Prices: Hawai'i vs. Its Major Export Competitors

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The importance of agricultural input prices to farmers' choices can hardly be overemphasized. Many studies have estimated that the responsiveness of farmers to changes in input prices is significant not only to output supply (production level), but also to the productivity and thus profitability of farmers, the welfare of consumers, and the export earnings of countries and states. In addition, input prices provide valuable information for the formulation of government policies and programs aimed at promoting efficiency, stability, growth, and equity in the agricultural sector.[1]

According to ERS-USDA (2011), crop-related expenses are forecasted to rise in 2011 by an average of 9.5% from their 2010 values, and the principal drivers of these expenses are input prices. As Hawai'i's agriculture is in the midst of significant change and revitalization, input prices are very important given the growing view among many people in the Islands that agriculture, especially food crops, should be a more prominent concern.

The goal of this fact sheet is to compare the prices of different agricultural production inputs faced by Hawai'i farmers with those faced by farmers from other competing countries. The inputs under review include labor, energy, fertilizer, land, agricultural machinery, water, transportation, and financing. We first compare the input costs in Hawai'i relative to all countries with available data, then compare the input costs in Hawai'i relative to the state's major competitors in the top export markets for its agricultural goods, namely, the U.S. mainland and Japan. We consider the competitors of Hawai'i to be exporters to the U.S. mainland, for the agricultural exports analyzed in Yu et al. (2009), and exporters to Japan, for the goods analyzed in Parcon et al. (2010). Table 1 lists the top competitors of Hawai'i in agricultural products according to the aforementioned studies.

We attempt to make the comparison as consistent as possible by deriving data for a particular input from a single source. In cases where data for Hawai'i are not available, the average data for the U.S. are used as a basis of comparison. We cover the years 1998–2008, or as many of these years as are available in the data. Some crops reviewed include papayas, pineapples, coffee, macadamia nuts, flowers, and foliage.

As expected, Mexico and Canada, being partners of the U.S. in the North American Free Trade Agreement (NAFTA), are among the top competitors of Hawai'i in the U.S. mainland market. Mexico is the top exporter of papayas, but it also exports fresh pineapples, coffee, and foliage to the U.S. mainland. Canada, meanwhile, exports orchids and foliage. Competitors from Central and South America include Belize, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, and Guatemala. Agricultural products coming from these countries include papayas, raw sugar, coffee, foliage, and orchids. Competitors from Africa include Kenya, Malawi, and South Africa, with macadamia nuts as the main export product. Australia, meanwhile, competes in the market for raw sugar and macadamia nuts. Among European nations, Italy and the Netherlands compete in the market for orchids and foliage. Taiwan and Thailand likewise compete in these markets. The Philippines, meanwhile, competes for raw sugar.

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Table 1. Top Competitors for Hawai'i's Agricultural Exports – U.S. Mainland and Japan

U.S. Mainland		Japan	
North America	*Africa*	*South America*	*Oceania*
Mexico	Kenya	Brazil	Australia
Canada	Malawi	Colombia	*Europe*
Central and South America	South Africa	*Asia*	France
Belize	*Europe*	Indonesia	Switzerland
Brazil	Italy	Malaysia	United Kingdom
Colombia	Netherlands	Philippines	
Costa Rica	*Asia*	Singapore	
Dominican Republic	Philippines	Thailand	
Ecuador	Taiwan	China	
Guatemala	Thailand	South Korea	

Notes: Agricultural exports for the U.S. mainland were based on Yu et al. (2009). Top competitors were based on import shares of different countries obtained from the USDA Foreign Agricultural Service (FAS) database.
Sources: www.fas.usda.gov and Parcon et al. (2010).

Japan's neighboring countries are the top competitors of Hawai'i in the Japanese market. For example, the Philippines is the top exporter of papayas to Japan. Indonesia is a major exporter of coffee and tuna. Malaysia and Thailand are major exporters of cut flowers/buds. Singapore is a major exporter of processed cocoa. South Korea is the top exporter of abalone and seaweeds, while China is a major exporter of fruits and nuts, and cut flowers/buds. Hawai'i competitors in the Japan market from South America include Brazil and Colombia, which are both competitors in the market for coffee. The latter is likewise a major competitor in cut flowers/buds. Among European nations, France is a major competitor in fruits and nuts, Switzerland in cut flowers/buds, and the United Kingdom in coffee. Australia, meanwhile, is Hawai'i's top competitor in the macadamia nut market.

A. Labor

About 40–70% of costs in agricultural production worldwide are related to labor costs (Encina 2010).[2] In the case of Hawai'i, approximately 35–40% of agricultural production cost is labor (Arita et al. 2011). Hence, it is expected that labor costs play a central role in the competitiveness of Hawai'i agricultural producers, more than any other singular input such as fertilizer or pesticide. Table 2A shows the 10 countries with the highest average monthly wage in agriculture, hunting, and forestry (NAICS 111, 112, 113). Among the 54 countries with available data on wages, the U.S. ranks 5th, with an average monthly wage of $1,530. Notable, however, is that Hawai'i's average monthly wage, $2,063, is 35% higher than the national average. Likewise, Hawai'i's wage rate has grown rapidly from 2002 to 2008, at an annual average rate of about 3.4%, compared to the national average of 3.1%.

Compared to its competitors[3] in the U.S. mainland market, Hawai'i has the highest average monthly wages, as seen in Table 2B. Relative to its competitors in the Japanese market, Hawai'i has the 3rd highest average monthly wage next to Switzerland and the United Kingdom, as seen in Table 2C. While Hawai'i's labor cost can be competitive relative to its high-income country competitors such as Switzerland and the United Kingdom, it is quite apparent that it cannot compete with the low labor costs of its middle- and low-income country competitors in South and Central America and Asia.

B. Energy—Fuel and Electricity

Energy costs are embedded in most agricultural inputs and processes—fertilizer and pesticide production, irrigation, crop drying, operation of agricultural machinery, refrigeration, and packaging. Thus, energy costs are of utmost concern not just to farmers, but to consumers who face these costs embedded in the price of their food. Table 3 shows the pump price for diesel for the top 10 of 176 countries, compared with the U.S.'s ranking of 117th. Rugaber (2011) reports that energy prices in the U.S. are still relatively tame compared with the inflation in many developing countries; nevertheless, Hawai'i remains very vulnerable to fluctuations in the global oil markets.

Table 4A displays the 10 countries with the highest electricity prices, a list on which the U.S. does not appear. Among 52 countries with available data, the U.S. ranks

Table 2A. Monthly Wages in Agriculture, Hunting, and Forestry[1] (U.S. Dollars)

Rank[2]	Country[3]	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Switzer-land	3,190.07		2,903.76		2,883.34		3,457.99		3,392.77		4,074.45	3,317.06
2	Bermuda							3,500.00	3,023.00	3,181.00	3,288.00		3,248.00
3	United Kingdom	1,830.34	1,869.08	1,750.26		2,014.92	2,223.77	2,654.80	2,652.37	2,794.55	3,177.45		2,329.73
4	San Marino				1,338.74	1,477.86	1,660.26	2,011.51	1,459.11	1,661.69			1,601.53
5	Hawai'i				1,856.00	1,904.00	1,944.00	1,932.00	2,060.00	2,180.00	2,276.00	2,348.00	2,062.50
	% annual growth					2.59%	2.10%	-0.62%	6.63%	5.83%	4.40%	3.16%	3.44%
	U.S.	1,260.00	1,360.00	1,388.00	1,484.00	1,496.00	1,588.00		1,608.00	1,688.00	1,648.00	1,776.00	1,529.60
	% annual growth		7.94%	2.06%	6.92%	0.81%	6.15%		1.26%	4.98%	-2.37%	7.77%	3.10%
6	Israel								1,069.81	1,105.75	1,215.17	1,468.50	1,214.81
7	Australia	1,100.62	1,210.36	1,089.96									1,133.65
8	New Caledonia		1,088.76										1,088.76
9	Slovenia	900.35	887.76	771.01	764.37	817.07	1,002.18	1,130.85	1,163.56	1,238.98			964.01
10	Italy												798.59

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank. [2] Ranking is based on the average for the period 1998–2008. There were a total of 49 countries with available data, but others were not shown for brevity purposes. [3] Turkey, Zimbabwe, and Serbia experienced hyperinflation during the period covered and thus were excluded from the list of countries.
Sources: Country data are from LABORSTA-ILO (http://laborsta.ilo.org)
Data for Italy are from agri-info.eu (http://www.agri-ifo.eu). Hawai'i data are from the 2008 Employment and Payrolls in Hawai'i.

Table 2B. Monthly Wages in Agriculture, Hunting, and Forestry,[1] U.S. Mainland Market Competitors of Hawai'i (U.S. Dollars)

Rank	Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Hawai'i				1,856.00	1,904.00	1,944.00	1,932.00	2,060.00	2,180.00	2,276.00	2,348.00	2,062.50
	U.S.	1,260.00	1,360.00	1,388.00	1,484.00	1,496.00	1,588.00		1,608.00	1,688.00	1,648.00	1,776.00	1,529.60
2	Australia	1,100.62	1,210.36	1,089.96									1,133.65
3	Italy												798.59
4	Costa Rica	198.34	222.67	216.26	206.39			236.86	217.53			196.98	213.58
5	Brazil	274.32	183.42	182.69	161.60	140.14							188.43
6	Mexico	114.17	127.50	149.27	180.49	184.16	181.06	183.13	204.62	214.95	228.23	239.09	182.42
7	Colombia					61.84	79.52	165.68	113.53	136.90	155.54		118.84
8	Philippines	89.92	111.51		106.92		115.69		132.74				111.36
9	Thailand				47.08	131.04	56.54			81.29	95.15		82.22

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank.
Sources: Country data are from LABORSTA-ILO (http://laborsta.ilo.org)
Data for Italy are from agri-info.eu (http://www.agri-ifo.eu). Hawai'i data are from the 2008 Employment and Payrolls in Hawai'i.

Table 2C. Monthly Wages in Agriculture, Hunting, and Forestry,[1] Japanese Market Competitors of Hawai'i (U.S. Dollars)

Rank	Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Switzerland	3,190.07		2,903.76		2,883.34		3,457.99		3,392.77		4,074.45	3,317.06
2	United Kingdom	1,830.34	1,869.08	1,750.26		2,014.92	2,223.77	2,654.80	2,652.37	2,794.55	3,177.45		2,329.73
3	Hawai'i				1,856.00	1,904.00	1,944.00	1,932.00	2,060.00	2,180.00	2,276.00	2,348.00	2,062.50
	U.S.	1,260.00	1,360.00	1,388.00	1,484.00	1,496.00	1,588.00		1,608.00	1,688.00	1,648.00	1,776.00	1,529.60
4	Australia	1,100.62	1,210.36	1,089.96									1,133.65
5	Brazil	274.32	183.42	182.69	161.60	140.14							188.43
6	Colombia					61.84	79.52	165.68	113.53	136.90	155.54		118.84
7	Philippines	89.92	111.51		106.92		115.69		132.74				111.36
8	Thailand				47.08	131.04	56.54			81.29	95.15		82.22
9	Indonesia										46.36	54.87	50.61

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank.
Sources: Country data are from LABORSTA-ILO (http://laborsta.ilo.org). Hawai'i data are from the 2008 Employment and Payrolls in Hawai'i

Table 3. Energy Prices: Pump Price for Diesel[1] (U.S. Dollars per Gallon)

Rank[2]	Country	1998	2000	2002	2004	2006	2008	Average
1	Monaco						5.87	5.87
2	United Kingdom	4.20	4.62	4.54	6.06	6.55	6.25	5.37
3	Norway	4.16	4.35	4.47	5.45	6.28	6.17	5.15
4	French Polynesia					4.50	5.26	4.88
5	Italy	3.52	3.14	3.26	4.96	5.64	6.17	4.45
6	Denmark	3.22	3.41	3.56	5.11	5.49	5.83	4.43
7	Switzerland	3.44	3.18	3.52	5.19	5.15	5.75	4.37
8	Sweden	3.18	3.03	3.63	5.19	5.45	5.75	4.37
9	Liechtenstein	3.37	3.18	3.52	5.19	5.15	5.75	4.36
10	Ireland	3.86	2.73	3.03	4.88	5.11	6.21	4.30
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117	U.S.	1.02	1.82	1.48	2.16	2.61	2.95	2.01

Notes: [1] Fuel prices=pump prices of most widely sold grade of diesel fuel. [2] Ranking is based on the average for the period 1998–2008. A total of 176 countries had available data, but others were omitted for brevity purposes. **Source:** World Development Indicators of the World Bank (http://data.worldbank.org/indicator/EP.PMP.DE)

Table 4A. Electricity Price for Industry[1] (U.S. Dollars per Kilowatt Hour)

Rank[2]	Country	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Dominican Republic							0.217	0.207	0.212
2	Nicaragua								0.186	0.186
3	Italy	0.107	0.113	0.147	0.161	0.174	0.210	0.237	0.290	0.180
4	Haiti							0.174		0.174
(5)	Hawai'i	0.117	0.110	0.122	0.134	0.158	0.180	0.184	0.261	0.158
	% annual growth		-5.65%	10.71%	9.43%	18.28%	13.74%	2.34%	41.73%	12.94%
5	Panama							0.144		0.144
6	Japan	0.127	0.115	0.122	0.127	0.123	0.117	0.116		0.121
7	Chile							0.096	0.145	0.121
8	Austria				0.096	0.102	0.109	0.134	0.154	0.119
9	Colombia							0.103	0.125	0.114
10	Ireland	0.060	0.075	0.094	0.096	0.099	0.122	0.149	0.186	0.110
-//-										
39	U.S.	0.051	0.049	0.051	0.053	0.057	0.062	0.064	0.070	0.057
	% annual growth		-3.92%	4.08%	3.92%	7.55%	8.77%	3.23%	9.38%	4.71%

Notes: [1] Energy end-use prices including taxes, converted using exchange rates. [2] Ranking is based on average for the period 2001–2008. A total of 53 countries had available data, but others were omitted for brevity purposes. **Sources:** Country data from the International Energy Agency, Energy Prices & Taxes–Quarterly Statistics, Fourth Quarter 2009, Part II, Section D, Table 21; and Part III, Section B, Table 18, 2008. Hawai'i data from the United States Energy Information Administration, *Monthly Energy Review,* May 2010, Table 9.9.

Table 4B. Electricity Prices for Industry,[1] U.S. Mainland Market Competitors of Hawai'i (U.S. Dollars per Kilowatt Hour)

Rank	Country	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Dominican Republic							0.217	0.207	0.212
2	Italy	0.107	0.113	0.147	0.161	0.174	0.210	0.237	0.290	0.180
3	Hawai'i	0.117	0.110	0.122	0.134	0.158	0.180	0.184	0.261	0.158
4	Colombia							0.103	0.125	0.114
5	Brazil							0.095	0.120	0.108
6	Costa Rica							0.079	0.093	0.086
7	Mexico	0.053	0.056	0.062	0.077	0.088	0.099	0.102	0.126	0.083
8	Ecuador							0.065	0.070	0.068
9	Thailand	0.056	0.057	0.060	0.063	0.066	0.078	0.073	0.075	0.066
10	Netherlands	0.059	c	c	c	c	c	c	c	0.059
11	Australia	0.044	0.049	0.054	0.061					0.052
12	Canada	0.042	0.039	0.047	0.049	0.055	0.059			0.049
13	South Africa	0.013	0.012	0.019	0.022	0.022	0.022			0.018

Notes: [1] Energy end-use prices including taxes, converted using exchange rates.
c = confidential
Sources: Country data are from the International Energy Agency, Energy Prices & Taxes–Quarterly Statistics, Fourth Quarter 2009, Part II, Section D, Table 21; and Part III, Section B, Table 18, 2008.
Hawai'i data are from the United States Energy Information Administration, *Monthly Energy Review*, May 2010, Table 9.9.

Table 4C. Electricity Prices for Industry,[1] Japanese Market Competitors of Hawai'i (U.S. Dollars per Kilowatt Hour)

Rank	Country	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Hawai'i	0.117	0.110	0.122	0.134	0.158	0.180	0.184	0.261	0.158
2	Colombia							0.103	0.125	0.114
3	Brazil							0.095	0.120	0.108
4	Singapore		0.067	0.070	0.074	0.080	0.096	0.112	0.141	0.091
5	United Kingdom	0.051	0.052	0.055	0.067	0.087	0.117	0.130	0.146	0.088
6	Switzerland	0.068	0.070	0.079	0.084	0.081	0.080	0.084	0.094	0.080
7	Thailand	0.056	0.057	0.060	0.063	0.066	0.078	0.073	0.075	0.066
8	Indonesia	0.035	0.048	0.062	0.063	0.059	0.068	0.068	0.064	0.058
9	Taiwan	0.056	0.053	0.053	0.055	0.057	0.058	0.059	0.067	0.057
10	Korea	0.048	0.047	0.051	0.053	0.059	0.065	0.069	0.060	0.057
11	Australia	0.044	0.049	0.054	0.061					0.052
12	France	0.035	0.037	0.045	0.050	0.050	0.051	0.056	0.060	0.048

Notes: [1] Energy end-use prices including taxes, converted using exchange rates.
Sources: Country data are from the International Energy Agency, Energy Prices & Taxes–Quarterly Statistics, Fourth Quarter 2009, Part II, Section D, Table 21; and Part III, Section B, Table 18, 2008.
Hawai'i data are from the United States Energy Information Administration, *Monthly Energy Review*, May 2010, Table 9.9.

Table 5A. Fertilizer Prices – Urea[1] (U.S. Dollars per Metric Ton)

Rank[2]	Country[3]	1998	1999	2000	2001	2002	Average
1	Myanmar	13,860	13,973	13,533	13,010	39,686	18,812
2	Slovakia	10,037	8,748	7,979	8,627	9,772	9,033
3	Madagascar		3,408	2,971	3,389		3,256
4	Syrian Arab Republic	1,491	1,491	1,491	1,491	1,317	1,456
5	Guinea	1,363					1,363
6	Burundi	1,311	1,582	1,267	1,100		1,315
7	Equatorial Guinea				890	1,560	1,225
8	Nigeria	2,185		628	566		1,127
9	Seychelles		1,424	1,332	1,299	1,388	1,089
10	Norway	1,071					1,071
-//-							
37	U.S.	467	422	478	672	459	500

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank.
[2] Ranking is based on average for the period 1998–2002. There were a total of 88 countries with available data, but others were not shown for brevity purposes.
[3]Turkey and Ghana experienced hyperinflation during the period covered and thus were excluded from the list of countries.
Source: FAOSTAT Fertilizers Archive (http://faostat.fao.org/site/422/default.aspx#ancor)

39th, but if Hawai'i were ranked as a separate country, it would have the 5th-highest electricity price. In addition, while electricity prices have risen at an annual average rate of 4.7% for the nation, prices have risen by almost three times that much in Hawai'i, 12.9% for the period 2001–2008. Hence, while U.S. mainland farmers may enjoy relative advantages in energy costs, Hawai'i farmers, in contrast, are caught in a spiraling disadvantage. This is further confirmed in Tables 4B and 4C. Hawai'i ranks 3rd relative to its U.S. mainland competitors and 1st relative to its Japanese market competitors in terms of energy price. Hawai'i's dependence on oil for electricity generation[4] largely explains the energy cost disadvantage of Hawai'i relative to its competitors.

C. Fertilizer

ERS-USDA (2011) reported that U.S. fertilizer prices rose steadily between 2002 and 2008, with annual average prices rising by 264%. Due to a higher demand for fertilizers and the rising price of oil, fertilizer expenses are expected to continue to climb in 2011 and beyond. Tables 5A, 5B. and 5C show the prices of the three most commonly used fertilizers, namely, urea, superphosphate, and muriate of potash.[5] Among the 88 countries with available price data for urea, the U.S. ranks 37th; among the 46 countries with available data for superphosphate,[6] the U.S. ranks 23rd; and among the 52 countries with available data for potassium chloride (muriate of potash),[7] the U.S. ranks 34th. Relative to Hawai'i's U.S. mainland competitors, Table 5D shows that the U.S. ranks 5th highest in urea prices, while relative to Japanese market competitors, Table 5E shows that the U.S. ranks 2nd. Relative to Japanese market competitors of Hawai'i, the U.S. ranks 5th as having the highest price of muriate of potash,[8] as seen in Table 5F.

Overall, fertilizer prices in Hawai'i are even higher when shipping cost is considered. In June 2011, Matson Navigation, the leading cargo shipper to Hawai'i, raised its fuel surcharge to 47.5%, or well over $1,000 for every Hawai'i container.[9] Since different crops use different fertilizers in different proportions, it is expected that farmers will have different fertilizer costs. Nevertheless, increases in the price of fertilizers will, on average, reduce the returns of farmers if farm gate prices cannot be increased to cover the additional costs.

D. Land

Data on agricultural land costs that are comparable across countries are difficult to find. According to Brown (2003), land costs are fundamentally dependent on location, topography, and a range of other geographic and economic factors (for instance, soil productivity, potential yields of alternative crops, and relative proximity to infrastructure and markets); naturally, therefore, any land cost index will suffer considerable variations and deviations, and thus be difficult to compare with others with much certainty. Therefore, our national estimates of land costs are very crude averages and must be interpreted with caution.

Table 5B. Fertilizer Prices – Phosphate Concentrate[1] (U.S. Dollars per Metric Ton)

Rank[2]	Country[3]	1998	1999	2000	2001	2002	Average
1	Myanmar	15,585	24,995	24,208	23,272	23,664	22,345
2	Madagascar		5,092				5,092
3	Bahrain	2,314	2,250				2,282
4	Syrian Arab Republic	1,607		1,607	1,584	1,584	1,596
5	Austria	1,593	1,527	1,431	1,632		1,546
6	Burundi	1,390	1,617	1,418			1,475
7	Jamaica	1,261	1,180				1,221
8	Malta	1,007	943				975
9	Algeria	907					907
10	United Republic of Tanzania	857	870	847	814	775	832
-//-							
23	U.S.	607	611	559	565	530	574

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank. Phosphate concentrate was used as a substitute for superphosphate. [2] Ranking is based on average for the period 1998–2002. There were a total of 46 countries with available data, but others were not shown for brevity purposes. [3] Turkey and Ghana experienced hyperinflation during the period covered and thus were excluded from the list of countries.
Source: FAOSTAT Fertilizers Archive (http://faostat.fao.org/site/422/default.aspx#ancor)

The World Bank's *Global Approach to Environmental Analyses*, or GAEA (1999), attempted to estimate average land prices across different countries. A country's land value was estimated to be a multiple of its per-capita income, adjusted to incorporate broader factors.[10] Table 6A (p. 11) displays the estimated land prices based on the GAEA analysis. The table reveals that the U.S. belongs to the group of countries having land values between $20,001 and $30,000 per hectare.[11] This range is the 2nd highest among the 13 land-value brackets considered in the study. A majority of the competitors of Hawai'i, meanwhile, have land values below $15,000 per hectare,[12] as shown in Tables 6B and 6C (p. 12).

Brown (2003) and Breustedt and Habermann (2008) explain that most countries value agricultural land based on the income that the farmers of the land are expected to generate. In addition, both suggest that crop yield has a positive impact on the price of land.[13] Given the foregoing, cereal (grain) yield was used as a proxy for the value of land. Data on cereal yield provided rankings consistent with those of World Bank GAEA (1999). Table 7A (p. 13) displays the ranking of countries based on their cereal yield: Among a sample of 178 countries, the U.S. ranks 10th as having the highest cereal yield in the period 1998–2008. Relative to the competitors of Hawai'i in the U.S mainland and Japanese markets, U.S. ranks 2nd and 4th, respectively, as shown in Tables 7B and 7C (pp. 14 and 15). Whether land cost is based on the estimates provided by World Bank GAEA (1999) or the proxy variable crop yield, the U.S. is undoubtedly classified as having high agricultural land prices.

Looking at land costs, it is important to distinguish the value of agricultural land derived from agricultural production income and that derived as asset/capital gains appreciation value. Given its relative scarcity of land, Hawai'i has high real estate values that make agricultural land a prime target for conversion to urban use and, subsequently, highly lucrative property development. Analyzing U.S. Census of Agriculture data, Arita et al. (2011) find that an acre of Hawai'i agricultural real estate is approximately four times more valuable than U.S. mainland agricultural land.[14] Thus using broad

Table 5C. Fertilizer Prices – Muriate Over 45% K_2O (Potash)[1] (U.S. Dollars per Metric Ton)

Rank[2]	Country[3]	1998	1999	2000	2001	2002	Average
1	Myanmar	8,767	8,838	17,637	16,956	17,241	13,888
2	Slovakia	6,682	6,535	6,773	7,154	7,854	7,000
3	Madagascar		2,672	2,586			2,629
4	Austria	2,362	2,346	2,087	2,112	3,820	2,545
5	Burundi	1,359	1,582		923		1,288
6	Japan	665	803	841			770
7	United Republic of Tanzania	677					677
8	Saint Lucia	573	580				577
9	Norway	562					562
10	Germany	690	654	580	571	311	561
-//-							
34	U.S.	300	308	303	312	302	305

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank. Muriate over 45% K_2O (potash) was used as a substitute for potassium chloride (muriate of potash).
[2] Ranking is based on average for the period 1998–2002. There were a total of 52 countries with available data, but others were not shown for brevity purposes.
[3] Turkey and Ghana experienced hyperinflation during the period covered and thus were excluded from the list of countries.
Source: FAOSTAT Fertilizers Archive (http://faostat.fao.org/site/422/default.aspx#ancor)

Table 5D. Fertilizer Prices – Urea,[1] U.S. Mainland Competitors of Hawai'i (U.S. Dollars per Metric Ton)

Rank	Country	1998	1999	2000	2001	2002	Average
1	Dominican Republic	563	665	703	681	721	667
2	Mexico	597					597
3	South Africa	537	449	523	561	503	515
4	Kenya		680	445	415	497	509
5	U.S.	467	422	478	672	459	500
6	Australia	520	468	469	499	457	483
7	Colombia	358	282	469	463		393
8	Philippines	389	349	360	375	358	366
9	Thailand	410	335	345	327	340	351
10	Brazil	298	230	279	305	278	278

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank.
Source: FAOSTAT Fertilizers Archive (http://faostat.fao.org/site/422/default.aspx#ancor)

Table 5E. Fertilizer Prices – Urea,[1] Japanese Market Competitors of Hawai'i (U.S. Dollars per Metric Ton)

Rank	Country	1998	1999	2000	2001	2002	Average
1	Switzerland	708	711	611	684	738	691
2	Kenya		680	445	415	497	509
3	United Kingdom	611	518	428	413	532	500
4	U.S.	467	422	478	672	459	500
5	Australia	520	468	469	499	457	483
6	Korea	411	485	509	446		463
7	Singapore	364	423	498	470		439
8	Malaysia		407	451	435		431
9	France	429	354	405	449	429	413
10	Colombia	358	282	469	463		393
11	Philippines	389	349	360	375	358	366
12	Thailand	410	335	345	327	340	351
13	China	339			332		336
14	Brazil	298	230	279	305	278	278
15	Indonesia	98	309	310	212		232

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank.
Source: FAOSTAT Fertilizers Archive (http://faostat.fao.org/site/422/default.aspx#ancor)

Table 5F. Fertilizer Prices – Muriate Over 45% K_2O (Potash),[1] Japanese Market Competitors of Hawai'i (U.S. Dollars per Metric Ton)

Rank	Country	1998	1999	2000	2001	2002	Average
1	Colombia			407			407
2	Switzerland	418	407	364	371	398	392
3	Indonesia	333	350	376			353
4	South Korea	306	361	379			349
5	U.S.	300	308	303	312	302	305
6	Philippines	278	305	286	284	297	290
7	China				271		271
8	Malaysia		333	366	360		265
9	Singapore	259					259
10	Brazil	209	215	232	229	263	229

Notes: [1] Published data are in local currency units. Conversion to U.S. dollars was done using the published official exchange rate from the World Bank. Muriate over 45% K_2O (potash) was used as a substitute for potassium chloride (muriate of potash).
Source: FAOSTAT Fertilizers Archive (http://faostat.fao.org/site/422/default.aspx#ancor)

measures, such as those based on expected agricultural income, is likely to understate Hawai'i's true land value and thus the cost of land as an agricultural input.

E. Agricultural Machinery and Water Prices

We found no cross-country data for machinery costs. However, Lazarus (2009) showed that fuel and oil costs account for the highest share of total machinery cost, as shown in Table 8 (p. 16). Similarly, we found no cross-country data for water prices, but Yu et al. (2006) suggest the use of energy cost of irrigation as proxy of water price. Thus, for both agricultural machinery and water prices, the reader is referred back to section B (p. 2).

F. Transportation Cost

Being an island economy, Hawai'i is commonly perceived as having a maritime transportation cost disadvantage.[15] Tables 9A and 9B (p. 17) show the estimated cost of shipping agricultural goods to the U.S. mainland (Los Angeles, California) and Japan from different countries and Hawai'i. Notable is that while Hawai'i is nearest to Los Angeles relative to its U.S. mainland competitors, it faces the highest per-mile maritime transportation cost compared to its farther competitors. For instance, Thailand is about three times farther away from the U.S. mainland than Hawai'i, but its cost per container is lower than Hawai'i's. Brazil is about twice as far from the U.S. mainland as Hawai'i, but its cost per container is only slightly higher than Hawai'i's.[16] Thus, despite being geographically closer to the U.S. market, Hawai'i products seem to receive no transportation cost advantages over their foreign competitors.

While Hawai'i's maritime transportation cost to the U.S. mainland market seems to fall within a narrow band above the costs faced by its competitors, the picture, in contrast, is quite different in the Japanese market. Here Hawai'i faces a very large disadvantage relative to its Asian competitors, as the cost of shipping goods from Hawai'i to Japan is about four to five times higher than the cost from the Asian countries to Japan. Hence, regardless of whether Hawai'i is compared to its U.S. mainland or Japan competitors, it is quite apparent that Hawai'i faces a disadvantage in maritime transportation cost.

G. Cost of Financing Loans

Many studies have shown that access to and cost of credit are crucial factors for the agricultural sector. Credit is a major determinant of farmers' capacity to purchase various farm machines, equipment, and other supplies (seeds, fertilizers, etc.).[17] We use the prime lending rate as a proxy variable for the cost of financing faced by farmers. In most countries, this rate is used as a benchmark on many types of loans. Table 10A (p. 18) shows the 10 countries with the highest prime lending rate: Among the countries with available data, the U.S. ranks 148th.

Table 6A. Estimated International Land Prices (U.S. Dollars per Hectare)

Price of Land	Country
Greater than 30,000	Denmark, Japan, Luxembourg
20,001–30,000	Austria, Finland, France, Germany, Italy, Netherlands, Sweden, Switzerland, U.S.
15,001–20,000	Belgium, Norway, Spain, United Kingdom
10,001–15,000	Australia, Canada
5,001–10,000	Argentina, Bahamas, Barbados, Brunei Darussalam, Channel Islands, Cyprus, French Polynesia, Gabon, Greece, Guadeloupe, Iceland, Ireland, Israel, South Korea, Malta, New Zealand, Portugal, Puerto Rico, Singapore, Slovenia, Suriname, United Arab Emirates
3,001–5,000	New Celedonia, Martinique, Aruba, Netherland Antilles, Hungary, Qatar, Seychelles, Kuwait, Mauritius, Antigua and Barbuda, Malaysia, Trinidad and Tobago, Reunion, St. Kitts and Nevis, Czech Republic, Mexico, Saudi Arabia, Uruguay
2,001–3,000	Bahrain, Belarus, Botswana, Brazil, Costa Rica, Dominica, Estonia, Fiji, Grenada, Namibia, Panama, Poland, Russian Federation, St. Lucia, St. Vincent and the Grenadines, Thailand, Tonga, Turkey, Venezuela
1,001–2,000	Albania, American Samoa, Belize, Bulgaria, Chile, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Iran, Kazakhstan, North Korea, Latvia, Lebanon, Lithuania, Marshall Islands, Micronesia, Moldova, Paraguay, Romania, Samoa, Slovak Republic, South Africa, Syrian Arab Republic, Tunisia, Turkmenistan, Ukraine, Vanuatu, Yugoslavia
501–1,000	Angola, Azerbaijan, Bolivia, Cameroon, Comoros, Dem. Rep. of Congo, Rep. of Comorro, Djibouti, Georgia, Guatemala, Indonesia, Iraq, Jamaica, Kiribati, Kyrgyz Republic, Morocco, Myanmar, Oman, Papua New Guinea, Peru, Philippines, Senegal, Solomon Islands, Sri Lanka, Swaziland, Uzbekistan
301–500	Afghanistan, Algeria, Armenia, Cape Verde, Cote d'Ivoire, Guinea, Honduras, India, Lesotho, Libya, Mongolia, Tajikistan, Togo, Zaire, Zimbabwe
201–300	Bangladesh, Benin, Central African Republic, Gambia, Ghana, Haiti, Jordan, Liberia, Nicaragua, Pakistan, Rwanda, Sao Tome and Principe
101–200	Burkina Faso, Burundi, Cambodia, China, Equatorial Guinea, Guinea-Bissau, Kenya, Laos, Madagascar, Malawi, Maldives, Nigeria, Somalia, Yemen, Zambia
less than 100	Bhutan, Chad, Egypt, Ethiopia, Guyana, Mali, Mauritania, Mozambique, Nepal, Niger, Sierra Leone, Sudan, Tanzania, Uganda, Vietnam

Source: World Bank Global Approach to Environmental Analyses (1999)

Table 6B. Estimated International Land Prices, U.S. Mainland Competitors of Hawai'i (U.S. Dollars per Hectare)

Rank	Country	Price of Land
1	Italy	20,001–30,000
	Netherlands	
	U.S.	
2	Australia	10,001–15,000
	Canada	
3	Mexico	3,001–5,000
4	Brazil	2,001–3,000
	Costa Rica	
	Thailand	
5	Belize	1,001–2,000
	Colombia	
	Ecuador	
	Dominican Republic	
	South Africa	
6	Guatemala	501–1,000
	Philippines	
7	Kenya	101–200
	Malawi	

Source: Table 6A

Table 6C. Estimated International Land Prices, Japanese Market Competitors of Hawai'i (U.S. Dollars per Hectare)

Rank	Country	Price of Land
1	France	20,001–30,000
	Switzerland	
	U.S.	
2	United Kingdom	15,001–20,000
3	Australia	10,001–15,000
4	Singapore	5,001–10,000
	Korea	
5	Malaysia	3,001–5,000
6	Brazil	2,001–3,000
	Thailand	
7	Colombia	1,001–2,000
8	Philippines	501–1,000
9	China	101–200

Source: Table 6A

Relative to Hawai'i's competitors in the U.S. mainland and Japan, the U.S. has one of the lowest prime lending rates, as seen in Tables 10B and 10C (pp. 19 and 20). Hawai'i's farmers are also able to take advantage of government subsidy programs that may further strengthen their financing ability.

Discussion

Among the seven input costs considered in the previous sections, Hawai'i farmers face higher costs of labor, electricity, fertilizer, land, and transportation relative to their U.S. mainland and Japanese market competitors. Thus, it is apparent that Hawai'i farmers face a disadvantage relative to their competitors in most of the factors used in agricultural production. Nevertheless, Hawai'i farmers face lower costs for diesel fuel and loan financing. These can help mitigate the higher costs of other production inputs, provided that access to diesel fuel and financing remains affordable in the future.

Table 11 (p. 21) shows the various input prices and rankings of Hawai'i versus its competition in all countries, on the U.S. mainland, and in Japan. Hawai'i's input price rankings on the U.S. mainland and in Japan were in the top 50th percentile of all input prices reviewed except for diesel fuel and financing.

In order to increase the competitiveness of Hawai'i farmers and livestock producers, the following strategies may be considered:

- In terms of labor, which represents 35–40% of agricultural production costs, this primary source of Hawai'i's competitive disadvantage can be alleviated by substituting capital for labor to increase farm productivity. The adoption of machinery and technology, also called "capital," along with more highly skilled and technically oriented workers, may also attract and retain labor participation in the agricultural sector.
- In terms of energy/electricity, alternate, off-grid sources of energy to generate electricity for farm use are an important consideration. Potential sources of alternate energy in Hawai'i include solar, wind, hydro, geothermal, and biodiesel. Many of these alternate sources are already in farm and commercial use.
- In terms of fertilizer, farmers should review alternate sources of recyclable waste materials available locally to offset the existing volume of fertilizers

Table 7A. Cereal Yield[1] (Kilograms per Hectare)

Rank[2]	Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Belgium			8021	8218	8501	8531	9185	8650	8207	7887	8576	8420
2	Netherlands	7307	7470	7906	7280	7691	8324	8411	8204	8192	6940	8308	7821
3	Ireland	6343	7170	7841	7628	6597	7158	8159	7015	7465	7188	7597	7287
4	France	7390	7268	7240	6740	7470	6136	7540	6983	6802	6546	7293	7037
5	United Kingdom	6662	7044	7165	6292	7076	7029	7031	7196	7277	6634	7419	6984
6	New Zealand	6277	6169	6273	6484	6440	6913	7169	7401	7020	7916	7380	6858
7	Germany	6339	6698	6453	7052	6251	5749	7357	6723	6487	6183	7119	6583
8	South Korea	6089	6367	6436	6560	6087	5729	6497	6376	6401	6110	7064	6338
9	Switzerland	6774	5791	6601	6161	6431	5087	6732	6300	6156	6418	6510	6269
10	U.S.	5676	5733	5854	5893	5549	6025	6851	6452	6405	6704	6624	6161

Notes: [1] Cereal yield, measured as kilograms per hectare of harvested land, includes wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains. Production data on cereals relate to crops harvested for dry grain only. Cereal crops harvested for hay or harvested green for food, feed, or silage and those used for grazing are excluded. [2] Ranking is based on the average for 178 countries in the period 1998–2008. Values were not shown for other countries for brevity purposes.
Source: The World Bank (http://data.worldbank.org/topic/agriculture-and-rural-development)

Table 7B. Cereal Yield,[1] U.S. Mainland Market Competitors of Hawai'i (Kilograms per Hectare)

Rank	Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Netherlands	7,307	7,470	7,906	7,280	7,691	8,324	8,411	8,204	8,192	6,940	8,308	7,821
2	U.S.	5,676	5,733	5,854	5,893	5,549	6,025	6,851	6,452	6,405	6,704	6,624	6,161
3	Italy	5,078	5,047	4,994	4,821	4,959	4,307	5,444	5,361	5,316	5,256	5,275	5,078
4	Dominican Republic	3,581	3,996	4,139	4,305	4,343	3,995	3,819	4,623	4,271	4,360	4,246	4,152
5	Colombia	3,060	3,147	3,290	3,335	3,394	3,794	3,868	3,801	3,992	3,993	4,154	3,621
6	Costa Rica	3,769	3,677	3,626	3,550	3,683	3,171	3,059	3,189	3,424	3,072	3,803	3,457
7	Brazil	2,580	2,720	2,661	3,149	2,846	3,385	3,132	2,883	3,211	3,553	3,829	3,086
8	Mexico	2,640	2,708	2,761	2,856	2,914	2,964	3,079	3,131	3,214	3,354	3,454	3,007
9	Canada	2,783	3,088	2,806	2,447	2,375	2,760	3,142	3,216	3,046	2,967	3,387	2,910
10	Philippines	2,241	2,465	2,581	2,668	2,731	2,823	2,992	3,049	3,181	3,320	3,334	2,853
11	Thailand	2,565	2,537	2,719	2,725	2,700	2,734	2,921	3,002	2,963	3,044	3,014	2,811
12	South Africa	2,180	2,195	2,759	2,422	2,771	2,536	2,778	3,307	3,140	2,786	3,807	2,789
13	Belize	2,459	2,806	2,420	3,101	2,454	2,956	2,524	3,042	2,510	2,640	2,428	2,667
14	Ecuador	1,955	2,123	2,235	1,899	2,444	2,617	2,922	2,842	2,842	3,154	2,991	2,548
15	Australia	1,986	2,111	1,962	2,219	1,088	2,090	1,705	2,087	1,054	1,172	1,650	1,739
16	Guatemala	1,680	1,737	1,773	1,825	1,727	1,631	1,574	1,344	1,500	1,624	1,624	1,640
17	Kenya	1,590	1,428	1,375	1,639	1,488	1,594	1,806	1,646	1,659	1,787	1,417	1,584
18	Malawi	1,322	1,745	1,675	1,175	1,046	1,209	1,021	778	1,445	2,467	1,599	1,407

Notes: [1] Cereal yield, measured as kilograms per hectare of harvested land, includes wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains. Production data on cereals relate to crops harvested for dry grain only. Cereal crops harvested for hay or harvested green for food, feed, or silage and those used for grazing are excluded.
Source: The World Bank (http://data.worldbank.org/topic/agriculture-and-rural-development)

Table 7C. Cereal Yield,[1] Japanese Market Competitors of Hawai'i (Kilograms per Hectare)

Rank	Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	France	7,390	7,268	7,240	6,740	7,470	6,136	7,540	6,983	6,802	6,546	7,293	7,037
2	United Kingdom	6,662	7,044	7,165	6,292	7,076	7,029	7,031	7,196	7,277	6,634	7,419	6,984
3	Switzerland	6,774	5,791	6,601	6,161	6,431	5,087	6,732	6,300	6,156	6,418	6,510	6,269
4	U.S.	5,676	5,733	5,854	5,893	5,549	6,025	6,851	6,452	6,405	6,704	6,624	6,161
5	China	4,954	4,947	4,756	4,802	4,890	4,878	5,190	5,226	5,313	5,315	5,535	5,073
6	Indonesia	3,817	3,896	4,026	4,045	4,170	4,248	4,274	4,311	4,366	4,465	4,694	4,210
7	Colombia	3,060	3,147	3,290	3,335	3,394	3,794	3,868	3,801	3,992	3,993	4,154	3,621
8	Korea	3,147	2,898	2,443	3,112	3,327	3,452	3,547	3,489	3,692	3,432	3,698	3,294
9	Malaysia	2,843	2,910	3,040	3,108	3,232	3,347	3,315	3,407	3,384	3,325	3,557	3,224
10	Brazil	2,580	2,720	2,661	3,149	2,846	3,385	3,132	2,883	3,211	3,553	3,829	3,086
11	Philippines	2,241	2,465	2,581	2,668	2,731	2,823	2,992	3,049	3,181	3,320	3,334	2,853
12	Thailand	2,565	2,537	2,719	2,725	2,700	2,734	2,921	3,002	2,963	3,044	3,014	2,811
13	Australia	1,986	2,111	1,962	2,219	1,088	2,090	1,705	2,087	1,054	1,172	1,650	1,739

Notes: [1] Cereal yield, measured as kilograms per hectare of harvested land, includes wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains. Production data on cereals relate to crops harvested for dry grain only. Cereal crops harvested for hay or harvested green for food, feed, or silage and those used for grazing are excluded.
Source: The World Bank (http://data.worldbank.org/topic/agriculture-and-rural-development)

Table 8. Machinery Cost Estimates

			Per Hour				% Share			
Tractor or Combine HP	Net Cost of New Power Unit (in US$)	Annual Hours of Use	Fuel & Oil Cost	Maintenance & Repair Cost	Depreciation Cost	Overhead Cost[1]	Fuel & Oil Cost	Maintenance & Repair Cost	Depreciation Cost	Overhead Cost*
40	19,000	400	6.78	0.64	2.52	2.46	54.68%	5.16%	20.32%	19.84%
60	25,000	400	10.16	0.84	3.32	3.20	57.99%	4.79%	18.95%	18.26%
75	29,000	400	12.71	1.03	3.73	3.75	59.90%	4.85%	17.58%	17.67%
105 MFWD	71,000	450	17.79	2.13	7.65	8.12	49.85%	5.97%	21.43%	22.75%
130 MFWD	91,000	450	22.02	2.73	12.28	9.42	47.41%	5.88%	26.44%	20.28%
160 MFWD	111,000	500	27.10	3.70	13.56	10.37	49.52%	6.76%	24.78%	18.95%
200 MFWD	138,000	500	33.88	4.60	16.85	12.84	49.70%	6.75%	24.72%	18.84%
225 MFWD	158,000	400	38.12	4.21	23.84	18.49	45.03%	4.97%	28.16%	21.84%
260 MFWD	163,000	400	38.32	2.61	24.60	19.06	45.30%	3.09%	29.08%	22.53%
310 MFWD	172,000	400	45.69	2.75	25.95	20.09	48.36%	2.91%	27.47%	21.26%
360 MFWD	190,000	400	53.06	3.04	28.67	22.15	49.63%	2.84%	26.81%	20.72%
425 MFWD	222,000	400	62.64	3.55	33.50	25.81	49.91%	2.83%	26.69%	20.57%
225 Tracked Tractor	147,000	400	38.12	2.35	22.18	17.23	47.72%	2.94%	27.77%	21.57%
275 HP Combine	206,000	300	46.59	34.37	45.06	30.95	29.68%	21.90%	28.71%	19.72%
340 HP Combine	233,000	300	57.60	38.87	50.97	35.11	31.55%	21.29%	27.92%	19.23%
315 HP SP Forage Harvester Base Unit	175,000	200	29.11	13.26	50.94	42.42	21.45%	9.77%	37.53%	31.25%
570 HP SP Forage Harvester Base Unit	265,000	200	52.67	20.08	77.14	63.37	24.70%	9.42%	36.17%	29.71%
Average							44.84%	7.18%	26.50%	21.47%

Notes: [1]Overhead costs include interest, insurance, and housing.
Source: Lazarus (2009)

imported into the state. Some of these recyclable waste materials include chicken manure, which is utilized in the Natural Farming technique popularized by Master Cho; compost from food waste; fish waste; and tree trimmings, including pods from monkey pod trees.

- In terms of land, the designation of Important Agricultural Lands (IAL) should be sought to preserve the availability of agriculturally suitable lands into the foreseeable future. Additional acreage in state and county agricultural parks should also be established to improve farmers' access to affordable farmland, and long-term leases should be established to support commercial agricultural production.
- In terms of agricultural machinery and water prices, the findings are complementary to fuel and electric-

Table 9A. Transportation Cost Estimates, U.S. Mainland Market Competitors of Hawai'i (U.S. Dollars)

Rate/Origin	Hawai'i (Honolulu)	Brazil (Rio de Janeiro)	Thailand (Bangkok)	Australia (Sydney)	Netherlands (Rotterdam)
Freight (Base Rate)	2,612.00	3,883.60	3,850.00	2,870.00	2,451.40
BAF (Bunker Adjustment Factor) Charges	1,136.22	450.00	450.00	450.00	544.00
Wharfages	237.00	52.61		52.61	52.61
Bill of Lading		50.00	50.00	50.00	50.00
AMS (Automated Manifest Service) Filing Fee		35.00			
Terminal Handling Charges	535.00	400.00		400.00	400.00
TOTAL COST	4,520.22	4,871.21	4,350.00	3,822.61	3,498.01
Distance (Miles) From Origin to Los Angeles, CA	2,555	6,301	8,267	7,489	5,580
Cost per mile (TOTAL COST/ Distance)	1.77	0.77	0.53	0.51	0.63

Notes: Estimates are based on 40' dry container with total volume weight of 40,000 pounds, from origin (Hawai'i or competitor country) to Los Angeles, California. Commodity assumed to be transported is partially processed macadamia nuts.
Sources: Data on other countries' rate to Los Angeles are from http://www.freight-calculator.com (last accessed April 22, 2011). Estimates for Hawai'i to Los Angeles rates are from Matson Navigation Co. (BAF charges are adjusted to 43.5% based on http://www.staradvertiser.com/news/breaking/Matson_to_raise_fuel_sucharge_to_435_highest_on_record.html)

Table 9B Transportation Cost Estimates, Japanese Market Competitors of Hawai'i (U.S. Dollars)

Rate/Origin	Hawai'i	China	Malaysia	Philippines	Thailand
TOTAL	2,111.34	769.35	400.00	450.00	468.06

Notes: Estimates are based on 20' dry container from origin (Hawai'i or competitor country) to Japan.
Sources: Data on other countries' rates to Japan are from the various countries' Web sites (Shanghai Shipping Exchange, Malaysia Industrial Development Authority, Philippine Shippers' Bureau, Thailand Board of Investment). Hawai'i to Japan data is from Matson Navigation Co., the breakdown of which is as follows: freight (base rate), $1,830; documentation fee, $25; and destination fees, $256.34.

ity, and so the strategy mentioned above is applicable here, as well.

- In terms of transportation cost, the production of crops that can be sold in local markets should be encouraged. High transportation costs render crops intended for the local market more competitive than comparable imports. Additionally, local substitutes for imported livestock feed and other factor inputs should be sought out to lower Hawai'i's dependency on imports and subsequently lower the spending on transportation. As for financing loans, prudent utilization is needed to offset the above-mentioned

Table 10A. Prime Lending Rates (%)

Rank[1]	Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Zimbabwe	42.06	55.39	68.21	38.02	36.48	97.29	278.92	235.68	496.46	578.96		192.75
2	Angola	45.00	80.30	103.16	95.97	97.34	96.12	82.33	67.72	19.51	17.70	12.53	65.24
3	Brazil	86.36	80.44	56.83	57.62	62.88	67.08	54.93	55.38	50.81	43.72	47.25	60.30
4	Congo, Dem. Rep.									46.44	47.00	43.15	45.53
5	Malawi	37.67	53.58	53.13	56.17	50.54	48.92	36.83	33.08	32.25	27.72	25.28	41.38
6	Uruguay	54.39	50.03	46.06	48.56	118.38	58.94	23.68	13.61	9.25	8.94	12.45	40.39
7	Sao Tome and Principe	55.58	40.33	39.67	37.00	37.42	29.59	29.77	29.77	29.30	32.40	32.40	35.75
8	Kyrgyz Republic	73.44	60.86	51.90	37.33	24.81	19.13	29.27	26.60	23.20	25.32	19.86	35.61
9	Romania	55.32	65.64	53.85	45.40	35.43	25.44	25.61	19.60	13.98	13.35	14.99	33.51
10	Mongolia	48.05	44.01	36.95	37.35	35.52	31.91	31.47	30.57	26.94	21.83	20.58	33.20
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148	U.S.	8.35	7.99	9.23	6.92	4.68	4.12	4.34	6.19	7.96	8.05	5.09	6.63

Notes: [1] Ranking is based on average for the period 1998–2008. There were a total of 170 countries with available data, but others were not shown for the sake of brevity.
Source: http://data.worldbank.org/indicator/FR.INR.LEND

Table 10B. Prime Lending Rates, U.S. Mainland Market Competitors of Hawai'i (%)

Rank[1]	Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Brazil	86.36	80.44	56.83	57.62	62.88	67.08	54.93	55.38	50.81	43.72	47.25	60.30
2	Malawi	37.67	53.58	53.13	56.17	50.54	48.92	36.83	33.08	32.25	27.72	25.28	41.38
3	Dominican Republic	25.64	25.05	26.80	24.26	26.06	31.39	32.63	24.11	19.48	15.83	19.95	24.65
4	Costa Rica	22.47	25.74	24.89	23.83	26.42	25.58	23.43	24.66	22.19	12.80	15.83	22.53
5	Colombia	42.24	25.77	18.79	20.72	16.33	15.19	15.08	14.56	12.89	15.38	17.18	19.47
6	Kenya	29.49	22.38	22.34	19.67	18.45	16.57	12.53	12.88	13.64	13.34	14.02	17.76
7	Ecuador	49.55	17.42	17.12	16.23	15.81	13.64	9.95	9.62	9.81	12.08		17.12
8	Guatemala	16.56	19.51	20.88	18.96	16.86	14.98	13.81	13.03	12.76	12.84	13.39	15.78
9	Belize	16.50	16.27	16.01	15.45	14.83	14.35	13.94	14.26	14.21	14.33	14.14	14.94
10	South Africa	21.79	18.00	14.50	13.77	15.75	14.96	11.29	10.63	11.17	13.17	15.13	14.56
11	Mexico	26.36	23.74	16.93	12.80	8.21	7.02	7.44	9.70	7.51	7.56	8.71	12.36
12	Philippines	16.78	11.78	10.91	12.40	9.14	9.47	10.08	10.18	9.78	8.69	8.75	10.72
13	Australia	8.15	7.99	9.27	8.66	8.16	8.41	8.85	9.06	9.41	8.20	8.91	8.64
14	Thailand	14.42	8.98	7.83	7.25	6.88	5.94	5.50	5.79	7.35	7.05	7.04	7.64
15	U.S.	8.35	7.99	9.23	6.92	4.68	4.12	4.34	6.19	7.96	8.05	5.09	6.63
16	Italy	8.64	6.35	7.02	7.29	6.54	5.83	5.51	5.31	5.62	6.33	6.84	6.48
17	Canada	6.60	6.44	7.27	5.81	4.21	4.69	4.00	4.42	5.81	6.10	4.73	5.46
18	Netherlands	6.50	3.46	4.79	5.00	3.96	3.00	2.75	2.77	3.54	4.60	4.60	4.09

Notes: [1] Ranking is based on average for the period 1998–2008.
Source: http://data.worldbank.org/indicator/FR.INR.LEND

Table 10C. Prime Lending Rates, Japanese Market Competitors of Hawai'i (%)

Rank[1]	Country Name	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
1	Brazil	86.36	80.44	56.83	57.62	62.88	67.08	54.93	55.38	50.81	43.72	47.25	60.30
2	Colombia	42.24	25.77	18.79	20.72	16.33	15.19	15.08	14.56	12.89	15.38	17.18	19.47
3	Indonesia	32.15	27.66	18.46	18.55	18.95	16.94	14.12	14.05	15.98	13.86	13.60	18.57
4	Philippines	16.78	11.78	10.91	12.40	9.14	9.47	10.08	10.18	9.78	8.69	8.75	10.72
5	Australia	8.15	7.99	9.27	8.66	8.16	8.41	8.85	9.06	9.41	8.20	8.91	8.64
6	Korea, Rep.	15.28	9.40	8.55	7.71	6.77	6.24	5.90	5.59	5.99	6.55	7.17	7.74
7	Thailand	14.42	8.98	7.83	7.25	6.88	5.94	5.50	5.79	7.35	7.05	7.04	7.64
8	Malaysia	12.13	8.56	7.67	7.13	6.53	6.30	6.05	5.95	6.49	6.41	6.08	7.21
9	U.S	8.35	7.99	9.23	6.92	4.68	4.12	4.34	6.19	7.96	8.05	5.09	6.63
9	France	6.55	6.36	6.70	6.98	6.60	6.60	6.60					6.63
10	China	6.39	5.85	5.85	5.85	5.31	5.31	5.58	5.58	6.12	7.47	5.31	5.87
11	Singapore	7.44	5.80	5.83	5.66	5.37	5.31	5.30	5.30	5.31	5.33	5.38	5.64
12	United Kingdom	7.21	5.33	5.98	5.08	4.00	3.69	4.40	4.65	4.65	5.52	4.63	5.01
13	Switzerland	4.07	3.90	4.29	4.30	3.93	3.27	3.20	3.12	3.03	3.15	3.34	3.60

Notes: [1] Ranking is based on average for the period 1998–2008.
Source: http://data.worldbank.org/indicator/FR.INR.LEND

Table 11. Summary Input Price Comparison

	Hawai'i vs. All Countries	Hawai'i vs. Competitors in U.S. Market	Hawai'i vs. Competitors in Japan Market
Input	Price/Rank		
Labor	4th out of 54 countries	1st out of 9 countries	3rd out of 9 countries
Top-10 Range	($798.59–$3,317.06)	($82.22–$2,062.50)	($50.61–$3,317.06)
Energy – Diesel Fuel	117th out of 176 countries	N.A.	N.A.
Top-10 Range	($4.31–$5.87/gallon)		
Energy – Electricity	5th out of 52 countries	3rd out of 13 countries	1st out of 12 countries
Top 10 Range	($0.11–$0.21/kW hour)	($0.06 - $0.21/kW hour)	($0.06–$0.16/kW hour)
Fertilizer – Urea	37th out of 88 countries	5th out of 10 countries	4th out of 15 countries
Top 10 Range	($1,071–$18,812/metric ton)	($278–$667/metric ton)	($393–$691/metric ton)
Fertilizer – Superphosphate	23rd out of 46 countries	N.A.	N.A.
Top-10 Range	($832–$22,345/metric ton)		
Fertilizer – Potash	34th out of 52 countries	N.A.	5th out of 10 countries
Top-10 Range	($561–$13,888/metric ton)		($229–$407/metric ton)
Land	2nd out of 13 tiers	1st out of 7 tiers	1st out of 9 tiers
Range in Specified Tiers	(<$100–>$30,000/ha)	(<$200–>$20,000/ha)	(<$200–>$20,000/ha)
Land – Cereal Yield	10th out of 178 countries	2nd out of 18 countries	4th out of 13 countries
Top-10 Range	(6,161–8,420 kg/ha)	(2,853–7,821 kg/ha)	(3,086–7,037 kg/ha)
Maritime Transportation	N.A.	2nd out of 5 countries	1st out of 5 countries
Range of 5 Samples of Origin		($3,498–$4,871/container)	($400–$2,111/container)
Financing	148th out of 170 countries	15th out of 18 countries	9th out of 14 countries
Top-10 Range for Prime Lending Rate	(33.2%–192.75%)	(14.56%–60.3%)	(6.63%–60.3%)

Note: Top-10 range is shown for brevity purposes. Some inputs have many more countries' or competitors' data available.

factor input challenges; to achieve desirable crop yields and higher farm productivity; and to meet new market challenges such as food safety regulations and labeling requirements.

Because production costs are rather crop specific, the discussion above leans toward a more general overview assessment of input costs, which is nevertheless meaningful and insightful. Finally, it is important to keep in mind that our analysis has not addressed important demand-side factors influencing Hawai'i's overall export potential, such as quality and brand differences between Hawai'i and its export competitors. Compared to their competitors, some Hawai'i products enjoy important brand recognition that allows them to command a price premium and target higher-end niche/gourmet markets. Thus despite facing several input cost disadvantages, some Hawai'i products may continue to be competitive in U.S. mainland and Japanese markets.

Notes

1. See, for instance, Cuong (2006) and Apergis and Rezitis (2003).
2. This range is applicable to vineyards, orchards,

vegetable production, and much animal agriculture, but does not apply to most agronomic crops such as safflower, corn, and other grains.

3. Includes only competitors with available data. Succeeding comparisons will also be based on competitors with available data.
4. Coffman (2008) reports that almost 80% of Hawai'i's electricity demand is met with oil, which needs to be shipped in oil tankers over long distances.
5. This was based on total volume of consumption obtained from FAOSTAT Fertilizers Archive (http://faostat.fao.org/site/422/default.aspx#ancor).
6. Price data on superphosphate were not available, so phosphate concentrate was used as a substitute.
7. Muriate over 45% K_2O (potash) was used as a substitute for potassium chloride (muriate of potash) since the latter did not have data for prices.
8. Due to limited data coverage, no comparison was presented for U.S. mainland competitors in muriate of potash and superphosphate prices.
9. See article in *Hawaii Reporter*, June 16, 2011 (http://www.hawaiireporter.com/record-matson-fuel-surcharge-not-justified-by-oil-prices-analysis-shows/123)
10. Such as proportions of pasture, cropland, forest land, and arid land in the total land area.
11. This is equivalent to about $8,000–$12,000 per acre.
12. This is equivalent to about $6,000 per acre.
13. Farm size, labor, and capital endowments have no significant impact on the price of land.
14. While they find that Hawai'i's agricultural land commands significantly higher real estate value, its average rental rate of $37.40 per acre in 2007 is comparable to the U.S. mainland average of $37.30 per acre.
15. State of Hawaii Department of Agriculture FSMIP Final Report (2007).
16. Many have argued that the Jones Act has contributed to the high cost faced by Hawai'i agribusinesses, a cost which is not faced by Hawai'i's foreign competitors. The Jones Act is a United States Federal law that regulates maritime commerce in U.S. waters and between U.S. ports. It requires that all products transported between American ports must be shipped in American-made vessels by a crew that is 75% American. It thus limits competition from foreign shippers, which raises the cost of doing business in Hawai'i. (http://www.bastiatinstitute.org/wp-content/uploads/2009/08/Jones-Act-Study1.pdf)
17. See, for instance, Desjardins International Development (2005) and Taylor (2009).

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