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Globalization of the Frozen Potato Industry

Shiva S. Makki and Charles Plummer

This paper examines the globalization of the frozen potato industry, including the expansion of production and processing of potato products in the global market place, and future prospects for the industry. Driven largely by the rising popularity of Western style cuisine, frozen french fries and other frozen potato products have become global commodities generating billions of dollars in revenue worldwide. This study finds that with markets for frozen potato products in the United States and other developed countries hardly expanding, the growth of the frozen potato industry will critically depend on industry's ability to sustain growth in developing economies.

Key Words: french fries, frozen potato products, globalization, quick service restaurants

Driven largely by the rising popularity of Western style cuisine, particularly the offerings of quick service restaurants (QSRs), frozen french fries and other frozen potato products have become global commodities generating billions of dollars in revenue worldwide each year. Although exact worldwide production and sales figures for frozen potato products are not available, it has been estimated that total world frozen potato production capacity is about 11 million metric tons (mmt) a year (Huffaker, 2003). Worldwide exports of frozen potato products (over 90% of which are frozen french fries) in 2002 were valued at $2.2 billion. This value is at the wholesale level and does not account for the billions of dollars in value added from marketing at the retail level worldwide.

After a long period of growth and expansion in the industry, however, many major markets are showing signs of maturing, with the growth rate in consumption slowing or even declining during the past few years. Concerns about health and increased consumption of alternative foods (e.g., other fruits and vegetables) in

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developed countries are likely to adversely affect the demand for potato products.[1] On the other hand, per capita consumption of potatoes is low but growing in many developing countries. The growth of the frozen potato industry will critically depend on the industry's ability to sustain growth in those developing markets.

This study examines the globalization of the frozen potato industry, including the expansion of production and processing of potato products in the emerging markets, and prospects for the industry in the global market place. A cross-section of 33 foreign destinations accounting for over 90% of total U.S. exports in frozen potatoes is analyzed to identify critical factors that affect frozen potato exports.

Growth of the Frozen Potato Industry

The rapid, continuing growth in the fast-food industry over the years is what spawned growth in the frozen potato industry, first in the United States, and then the world (Plummer and Makki, 2002). Although commercial production of french fries began in the United States on a small scale in the mid-1940s, it didn't develop into a major industry until after the inception of QSRs in the 1950s (figure 1). As QSRs continued to expand, so did the frozen potato products industry, with U.S. output increasing from 0.58 mmt (129 million lbs.) in 1955 to 3.5 mmt (7.8 billion lbs.) in 2002, peaking at nearly 4 mmt (8.8 billion lbs.) in 1999 (American Frozen Food Institute, 2002).

Despite this tremendous growth in U.S. frozen potato production, the ever-increasing domestic and international demand for frozen potato products far exceeded U.S. processing capacity. By the 1970s, processors in Canada and Western Europe were producing frozen potato products to meet the growing demand. The United States is the largest producer of frozen potatoes in the world, producing an estimated 3.5 mmt in 2002. Canada is ranked second with a production of 1.2 mmt, and the Netherlands is a close third with a production of 1.1 mmt. It is estimated that these three countries (the United States, Canada, and the Netherlands) collectively produce somewhere between 55% and 75% of the world production of frozen potato products (figure 2). Canada and the Netherlands are currently very close in frozen potato production and capacity. Canada's frozen potato industry is still growing, while the industries in the Netherlands and the United States are both stagnant or possibly even declining slightly in size. The bulk of the remaining frozen potato production resides in other European Union (EU) nations, particularly Belgium, France, Germany, and the United Kingdom. Production also occurs on a much smaller scale in Australia, New Zealand, Eastern Europe, Asia, Africa, and South America, and as frozen potato consumption increases in these areas, local production is likely to increase as well.

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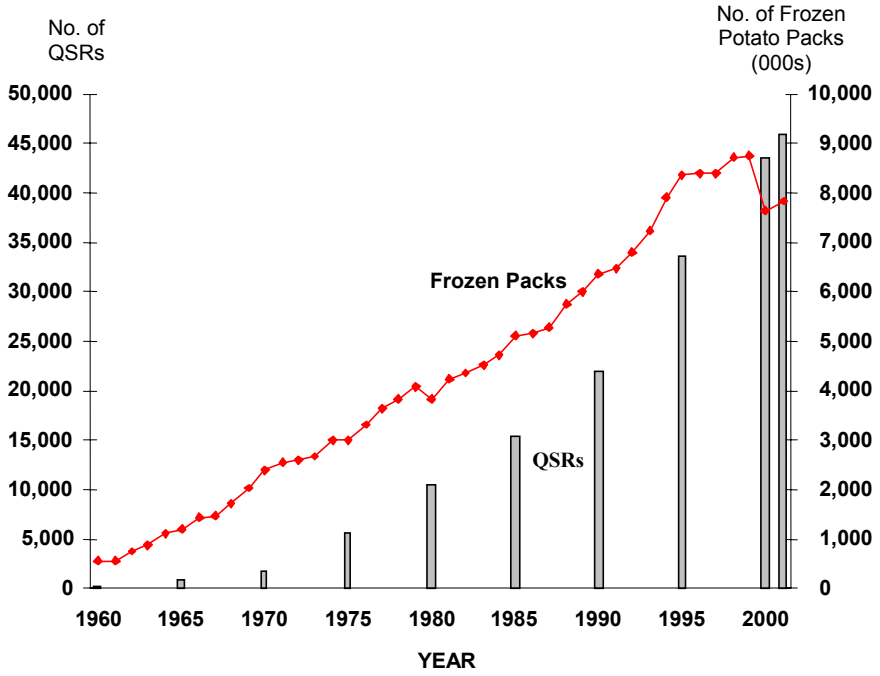
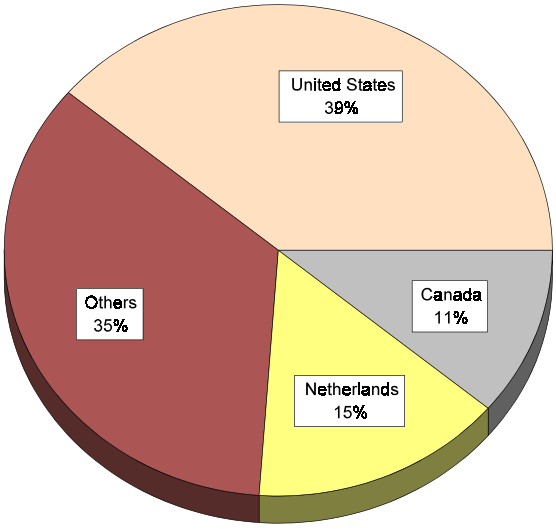
[1] A recent collection of medical studies concludes that QSRs have contributed to obesity problems in the United States. The supersizing of American waistlines has many QSRs scrambling for more diversified menus that include fruits and vegetables, but less emphasis on french fries. Increased consumer awareness has also pushed frozen potato manufacturers to seek new markets elsewhere.



Source: American Frozen Food Institute (2002).

Figure 1. Number of quick service restaurants worldwide and U.S. frozen potato product packs, 1960–2001



Source: United Nations Statistics Division (2002).

Figure 2. World frozen potato production capacity share by country

Major Markets for Frozen Potato Products

The major markets for frozen potato products are still predominantly the developed economies of the United States, the European Union, Canada, and Japan. However, as these markets mature, they are likely to have only limited growth potential in the future. This is most evident in the United States, the oldest and largest single-country market for frozen potato products, where demand appears to have leveled off in recent years. According to statistics from the American Frozen Food Institute, per capita consumption of frozen potato products in the United States was an estimated 12.5 kg (27.6 lbs.) per person in 2002 (product weight), down 5% from 2001, and 8.5% below the record level set in 1996.

Further evidence of market maturity is the relatively slow expansion of traditional burger and fry outlets in the United States compared with the world. For example, in 2002, the number of McDonald's outlets in the United States increased by only 3% from the previous year compared to a 3.9% average growth in the rest of the world (Plummer and Makki, 2002). With nearly 13,500 outlets in the United States in 2002, there was one McDonald's for approximately every 21,000 people.

Also showing signs of market maturity for frozen potato products is Japan, where consumption also seems to have declined recently following years of rapid growth. In 2002, per capita consumption of frozen french fries in Japan was 1.7 kg (3.7 lbs.) per person, down from a high of about 2.4 kg (5.3 lbs.) per person in 1999 (Plummer and Makki, 2002). Most of this consumption occurs through the food service industry, with McDonald's by far the leading supplier. After the United States and Canada, Japan ranks third in the number of McDonald's outlets per capita, with one outlet for approximately every 33,000 people.

The European Union markets for frozen potato products also may be nearing maturity. QSRs have been established in most EU countries since the 1970s, and in 2002 there was one McDonald's restaurant for roughly every 120,000 people (including Eastern Europe, where the industry is largely underdeveloped). European per capita consumption of frozen potato products in 2002, although based on limited data from only 13 countries, was estimated at about 6.5 kg (14.3 lbs.) per person, about half the U.S. level. However, 2002 per capita consumption in the United Kingdom, by far the largest European market for frozen potato products, was an estimated 16 kg (35 lbs.) per person in 2002. France ranks second in the EU, with a per capita consumption estimated at 7.1 kg (15.7 lbs.) per person in 2002 (Pierce, 2002, 2003).

Markets with the most growth potential for frozen potato products in the coming years are likely to be those that are still largely untapped by the QSR industries, particularly in Asia and Latin America. As these regions continue to develop economically, QSR outlets are expected to expand, increasing demand for frozen potato products at a potentially rapid pace. In Latin America, there is currently only one McDonald's for every 331,000 people, and in the Asian/Pacific region, this number is only one outlet for roughly every half million people. Two countries with perhaps the most potential for QSR growth and potential demand for frozen potato

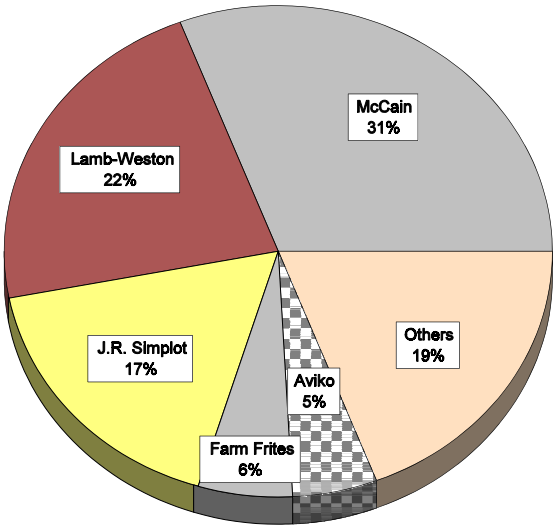
products are China and India. Development of the QSR industry in China has occurred rapidly in recent years (e.g., McDonald's expanded the number of outlets by 67% between December 2000 and December 2002) (Plummer and Makki, 2002), but is still in its relative infancy. At the end of 2002, there was only one McDonald's for approximately every 2.3 million people in China. And in India, with a population of one billion, the QSR industry hasn't really even started to develop, with only 54 McDonald's outlets in the entire country in 2002.

Companies Dominating the Frozen Potato Processing Industry

Relatively few companies dominate the frozen potato processing industry. The three largest producers—McCain Foods, Lamb-Weston, and J. R. Simplot Company—own and operate processing facilities around the world. Collectively, they account for nearly three-quarters of total world frozen potato product production. McCain Foods is a Canadian-based company, and Lamb-Weston and J. R. Simplot are American-based companies. In 2003, McCain controlled an estimated 31% of world production capacity, while Lamb-Weston and Simplot controlled 22% and 17%, respectively (figure 3). The other significant processing companies include Aviko and Farm Frites from the Netherlands, together accounting for about another 11% of world capacity. Although based in the Netherlands, both companies own and operate plants in other countries within the European Union.

McCain Foods, Lamb-Weston, and Simplot have developed into large, multinational corporations producing frozen potato products, particularly since the 1990s. While still maintaining much of their processing capacities in their home countries, each has branched out globally, building or acquiring processing facilities around the world. McCain's is perhaps the most globalized in terms of capacities spread around the world. With production beginning in Canada in 1957, McCain's first international plant was built in England in 1969. Currently, the corporation operates frozen potato-processing facilities in Canada, the United States, the European Union, Poland, Australia, New Zealand, South America, and Africa. Lamb-Weston, founded in 1950 and now an independent operating company of ConAgra, Inc., is the largest U.S.-based potato processor, but also owns and operates plants in Canada, the Netherlands, India, and Turkey. J. R. Simplot Company, another U.S. producer founded in the late 1940s, now operates frozen potato-processing facilities in the United States, Canada, Australia, and China.

The remaining 19% of production capacity lies in the hands of numerous small companies located around the world. Available information as of 2003 indicates there are more than 2 dozen companies operating in 19 different countries around the globe. Most of the small firms are based and operated in the United States, Canada, and the European Union. Unlike the larger companies, however, most of the smaller producers operate only one or a few plants, and usually only within their home country. Smaller producers, unless they are affiliated with a larger producer through a joint venture or partnership of some sort, often cannot supply the volume necessary for the large QSR chains, and consequently supply primarily local or regional restaurants and outlets.



Source: United Nations Statistics Division (2002).

Figure 3. World frozen potato production capacity share by processor

Globalized Production and Foreign Direct Investment

Output of U.S. frozen potato products has benefited and expanded from the globalization of the QSR industry. At the same time, increased worldwide demand has led to globalization in the production sector. As worldwide demand for frozen potato products increased, a natural progression for the processing industry has been to invest directly in major markets abroad. Evidence suggests that the industry is building and expanding potato processing plants worldwide. This allows processors to utilize global sourcing to reduce transportation costs by minimizing shipping distances of finished product. Globalized production also stabilizes the supply by limiting the effects of local crop disasters and shortages should they occur in a particular production region, while also allowing suppliers to avoid trade barriers in some instances.

The motivation for foreign direct investment (FDI) in frozen potatoes is no different from that in other related sectors such as wineries or beverages. Economics literature suggests FDI is motivated primarily by pressures to reduce transaction costs, to access and develop foreign markets, and to overcome trade barriers (Pompelli and Pick, 1999). FDI in frozen potatoes is also driven by a need for a cost-effective, stable, and adequate supply of frozen potatoes to meet the demands of a growing worldwide QSR sector. The expansion of processing plants around the world in recent years is a testimony to increasing FDI in the frozen potato industry.

Prospects for the U.S. Frozen Potato Industry

As noted previously, markets for frozen potato products in the United States and other developed countries are mature. Concerns about health and increased consumption of alternative foods in developed countries are likely to adversely affect the demand for potato products. On the other hand, per capita consumption of potatoes in many developing countries is low but growing. The growth of the frozen potato industry will critically depend on industry's ability to sustain growth in those developing markets.

In this section, we examine various destination market characteristics that affect exports of U.S. frozen potato products, in an attempt to identify growth markets and quantify the effects such market characteristics have on U.S. exports. It is hypothesized that U.S. exports are likely to be affected by the size of the markets and the purchasing power of consumers, as well as policies and institutions of destination countries. A cross-section of 33 foreign destinations is analyzed, accounting for over 90% of total U.S. exports in frozen potatoes over the time period of 1989–2001. The characteristics of developed and developing countries are examined separately, as market and other characteristics of these two groups are different and they affect exports differently. Depending on whether the country is developed or developing, the two country groups' characteristics are expected to have different relationships with U.S. exports of frozen potato products.

In this study, high-income Organization for Economic Cooperation and Development (OECD) countries are considered to be developed countries, while low- and middle-income countries are considered to be developing countries. Of the 33 selected countries, 19 comprise our developing-country group, with a combined urban population of 1.3 billion and gross domestic product (GDP) of over $13 trillion (table 1). Even though developing countries accounted for only 25% of U.S. frozen potato exports in 2001, they offer the greatest potential for growth. During the 1991–2001 period, the annual growth rate of U.S. exports to developing countries was 20.8%, while the growth rate of exports to developed countries was only 7.77% (table 1 and figure 4).

Analytical Framework

To analyze the factors determining U.S. exports of frozen potato products across a broad spectrum of economies with varying market sizes, per capita income levels, and institutions, we estimate time-series cross-section (TSCS) regressions that relate frozen potato exports to destination country characteristics. The basic econometric specification is as follows:

$$E_{it} = \alpha + \boldsymbol{\beta}\mathbf{X}_{it} + e_{it}, \quad (i = 1, 2, \ldots, N;\ t = 1, 2, \ldots, T), \tag{1}$$

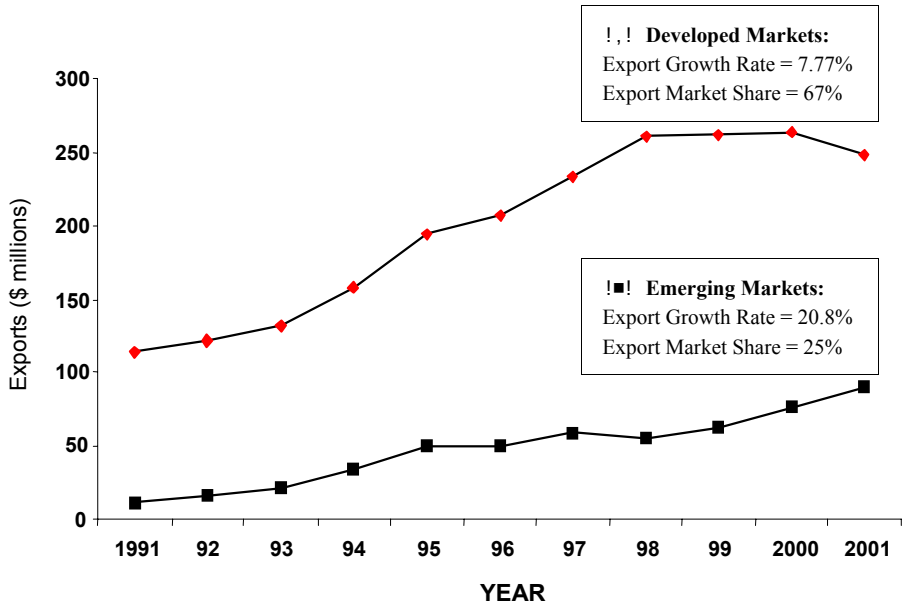
where E is U.S. exports of frozen potato products, $\mathbf{X}$ is a vector of exogenous variables representing various country characteristics, α is the intercept term, $\boldsymbol{\beta}$ is a

Table 1. U.S. Frozen Potato Industry: Export Growth Rate, Export Market Share, and Destination Country Characteristics

Destination Country	Export Growth Rate (%) 1991–2001	Export Market Share (%) 2001	GDP (PPP $ bil.) 2001	GDP Growth Rate (%) 1991–2001	GDP per Capita (PPP $) 2001	GDP per Capita Growth Rate (%) 1991–2001	Urban Population (% of total) 2001
DEVELOPED MARKETS:							
Australia	13.70	0.33	492	5.44	25,370	4.29	91
Belgium	—	0.00	262	3.53	25,520	3.25	97
Canada	10.33	4.70	843	4.70	27,130	3.72	80
Denmark	—	0.00	155	3.79	29,000	3.40	85
France	!6.38	0.00	1,420	3.50	23,990	3.11	76
Germany	!19.92	0.00	2,087	3.22	25,350	2.93	88
Hong Kong	9.88	5.14	167	5.17	24,850	3.62	100
Japan	6.49	47.03	3,193	2.60	25,130	2.35	65
Netherlands	26.78	0.26	436	4.27	27,190	3.65	65
New Zealand	—	0.00	74	4.66	19,160	3.64	86
Singapore	6.29	1.94	94	8.42	22,680	5.67	100
South Korea	12.34	6.99	714	7.06	15,090	6.16	80
Spain	—	0.00	828	4.38	20,150	3.84	76
United Kingdom	23.85	2.23	1,420	4.09	24,160	3.92	89
Summary:	**7.77**	**68.62**	**12,186**	**3.74**	**23,912**	**3.70**	**84**
DEVELOPING (EMERGING) MARKETS:							
Argentina	—	0.00	424	4.45	11,320	3.16	90
Brazil	!27.25	0.00	1,269	4.50	7,360	3.13	82
Chile	14.05	0.07	142	7.27	9,190	5.81	86
China	67.51	6.36	5,111	11.30	4,020	10.27	37
Colombia	29.16	0.07	303	4.12	7,040	2.25	75
Costa Rica	23.59	0.29	37	6.50	9,460	4.37	60
Dominican Repub.	54.92	0.20	60	7.59	7,020	5.88	59
Ecuador	!16.28	0.03	42	3.49	3,280	1.44	61
Guatemala	26.17	0.52	51	5.47	4,400	2.85	46
Honduras	7.38	0.07	19	4.31	2,830	1.61	45
India	1.09	0.03	2,930	7.30	2,840	5.55	28
Indonesia	10.34	0.97	615	5.21	2,940	3.80	43
Malaysia	8.96	2.10	208	8.08	8,750	5.64	62
Mexico	24.33	8.59	838	4.57	8,430	2.98	75
Panama	45.76	0.48	17	5.03	5,750	3.33	57
Peru	44.28	0.10	120	4.93	4,570	3.14	73
Philippines	14.44	3.50	301	4.34	3,840	2.04	59
Thailand	26.19	1.43	392	5.48	6,400	4.68	31
Venezuela	20.70	0.17	140	2.93	5,670	0.85	87
Summary:	**20.80**	**25.00**	**13,018**	**7.53**	**6,058**	**3.75**	**61**

Sources: United Nations Statistics Division (2002); The World Bank (2003).

Notes: GDP is gross domestic product; PPP is purchasing power parity; and a dash (—) indicates growth rate not available due to no reported exports in 2001.



Source: United Nations Statistics Division (2002).

Figure 4. U.S. frozen potato exports to developed and emerging markets, 1991–2001

vector of unknown parameters to be estimated, and e_{it} is the error term. Subscript i represents the country index and subscript t denotes time period, N is the number of countries, and T is the length of the time series for each country. The destination country characteristics that are examined in this study include market size, economic development, trade openness, inflation rate, foreign direct investment (FDI), and share of urban population.

The market size of the destination country is captured by the gross domestic product (GDP) in purchasing power parity (PPP) adjusted dollars, while the level of economic development is captured by the per capita income in the destination country, also in PPP-adjusted dollars. Both of these variables are expected to be positively associated with exports. Trade openness, measured by the share of imports in the GDP, indicates the trade policies of the destination country. The annual inflation rate, on the other hand, is a proxy for the stability of a country's fiscal and monetary policies. A high inflation rate, for example, would indicate unstable macroeconomic policies. Also, high inflation rates may suggest rapid devaluation of currencies in the destination countries, which could make imports more expensive. The inflation rate is measured by the rate of change in the consumer price index (CPI). Trade openness is expected to be positively associated with exports, and inflation rate to be negatively associated with exports. We also control for gross FDI and urban population. FDI is measured in terms of aggregate inflow of foreign investments as a share of GDP. Urban population is expressed as a share of total population.

The use of panel data has the advantage of providing additional insights into the effects of both time and location characteristics, but the error term may exhibit serial correlation and heteroskedasticity. However, appropriate data transformations can make the error term serial non-autoregressive and homoskedastic (Kmenta, 1986). We used the TSCSREG procedure included in the SAS software, which corrects the data for both serial correlation and heteroskedasticity (SAS Institute, Inc., 1999). Specifically, the Parks method of estimation was chosen, which offers an efficient procedure to model panel data with fixed effects (Parks, 1967). Based on preliminary analysis using the variance components method in the pooled data, the cross-sections account for most of the model's error structure.

Econometric Results

Table 2 presents the parameter estimates for the developed and developing countries, as well as a combined estimation. As shown by the table, the model for developed countries fits the data slightly better than the model for developing countries. The adjusted R^2 values are 0.93 and 0.85 for developed and developing countries, respectively. Findings of the econometric analysis indicate that U.S. exports of frozen potato products are affected by various destination country characteristics and their policies, discussed in further detail below.

Market Size

Market size of the importing country is perhaps the most important factor for the growth of the frozen potato industry. The purchasing power parity (PPP) adjusted GDP is used to measure the size of the destination country market. PPP adjustment makes the GDP comparable across different economies with different exchange rates and costs of living. Larger market size was hypothesized to have a positive effect on U.S. exports of frozen potato products. Our econometric results confirm that the larger the market size, the higher are U.S. exports of frozen potato products to both developed and developing countries. The estimated coefficients are statistically significant (table 2).

Economic Development

Global per capita income grew rapidly in the 1990s, particularly in the emerging market economies. Increased purchasing power among consumers in those emerging economies has led to greater demand for food in general, and restaurant food in particular. According to estimates, per capita income in the next decade is expected to grow twice as fast in the developing countries relative to developed countries. This projected trend has significant implications for growth of the frozen potato industry in those markets. In this study, economic development is indicated by PPP-adjusted per capita income.

Table 2. Parameter Estimates of U.S. Exports of Frozen Potato Products

	Parameter Estimates		
Variable	Developed Countries	Developing Countries	All Countries
Intercept	!5,025.22*	!2,502.16*	!781.45*
	(!13.99)	(!18.06)	(!2.89)
Market Size	30.13*	3.0486*	16.64*
	(29.29)	(5.68)	(68.79)
Economic Development	!0.1804*	0.1782*	!0.0106
	(!28.83)	(15.14)	(!1.52)
Trade Openness	29.12*	32.97*	10.47*
	(22.32)	(23.81)	(7.48)
Inflation Rate	!12.26*	!0.055*	!1.6716
	(!4.08)	(!4.92)	(!0.45)
Share of Urban Population	!0.0850*	!0.0088	!0.0957*
	(!3.51)	(!1.74)	(!6.50)
Foreign Direct Investment (*FDI*)	!10.46*	!30.50*	!44.71*
	(!9.26)	(!10.65)	(!33.74)
R^2	0.9287	0.8530	0.9750

Notes: An asterisk (*) denotes *t*-score within 1% or better level of significance. Values in parentheses are *t*-statistics.

Results presented in table 2 suggest that per capita income affects U.S. exports differently in developed and developing countries. In the case of developed countries, per capita income appears to be negatively related to U.S. exports of frozen potato products, while the opposite is true for developing countries. The estimated coefficients are statistically significant for both developed and developing countries.

A possible explanation for the finding of a negative relationship between exports and per capita income in developed countries is that U.S. exports to developed country markets have leveled off somewhat in recent years due to market maturity and saturation. Consumers in these economies may be showing signs of declining interest in frozen potato products—perhaps the result of increased consumer concern about fat intake, and perhaps because of increased consumption of other foods (i.e., diversity in the diet tends to increase with income). In contrast, income growth appears to be an important driving factor in the growth of U.S. exports in frozen potato products to developing countries. QSRs, often selling frozen potato products, are typically a relatively inexpensive source of away-from-home food, and therefore often attract consumers with more restrictive budgets. The positive, statistically significant coefficient implies that developing countries with high income growth rates are major growth markets for U.S. frozen potato products in the future.

Trade Openness

The trade openness of destination countries is a critical policy that influences exports. Openness of a country to imports was hypothesized to have a positive effect

on U.S. exports in frozen potato products. As reported in table 2, the estimated coefficients for trade openness are positive and statistically significant in all three equations, confirming that openness, as measured by share of imports of goods and services in the destination country's GDP, is positively associated with exports of frozen potato products in both developed and developing countries.

Inflation Rate

In this analysis, the inflation rate is used as a proxy for the degree of macroeconomic stability of a country. Inflation rate sends a signal to exporters on the stability of fiscal and monetary policies in the destination country. In addition, inflation indirectly devalues the domestic currency and makes imported goods more expensive. Therefore, the inflation rate, measured as the annual percentage change in consumer prices, was expected to be negatively associated with U.S. exports of frozen potato products. Our results support this argument. The estimated coefficients are negative and statistically significant for both developed and developing countries (table 2).

Share of Urban Population

With rapid urbanization in developing countries (the urban population is growing at 2.87% in developing countries compared to 0.76% in developed countries), the demand for processed food products including frozen potatoes is expected to increase. This is because QSRs, the main outlet for frozen potato products, are typically more concentrated in urban areas of developing countries. The same is not necessarily true of more sophisticated and better informed urban consumers in the developed world. In the case of developed countries, QSRs are more evenly distributed between urban and rural areas, and urbanization may even have a negative impact on frozen potato consumption. As reported in table 2, the estimated coefficient for urban population is negative for both developed and developing countries, but it is statistically significant only for developed countries—a result consistent with the declining demand for frozen potato products in the developed countries.

Foreign Direct Investment

In recent years, there has been a rapid growth of FDI in potato production and processing. The exact impact of such FDI on exports is often hotly debated among experts (e.g., Malanowski, Handy, and Henderson, 1995; Overend, Connor, and Salin, 1995; Gopinath, Pick, and Vasavada, 1999; Makki, Somwaru, and Bolling, 2004). Since the major purpose of FDI is to reduce transaction costs and improve the supply of frozen potato products to QSRs, foreign production and processing of potatoes was hypothesized to substitute for exports from the home country. Results from table 2 show a significant, negative relationship between FDI and trade in both developed and developing country markets. This finding suggests that increased FDI

may reduce exports of frozen potato products, implying substitution between the two. Moreover, it is consistent with the recent trends where multinational companies are setting up production and processing facilities in foreign countries.

Concluding Comments

This study has examined the globalization of the frozen potato industry, including the expansion of production and processing of potato products in the global market place, and future prospects for the industry. Driven largely by the rising popularity of Western style cuisine, particularly the offerings of quick service restaurants, frozen french fries and other frozen potato products have become global commodities generating billions of dollars in revenue worldwide each year. In recent years, however, major markets including the United States, the European Union, and Japan are showing signs of maturing, with the growth rate in consumption slowing or even declining in some cases.

This analysis indicates that during the 1990s, the annual growth rate of U.S. frozen potato exports to developed countries was only 8%, but they accounted for nearly two-thirds of exports in volume. In contrast, U.S. frozen potato exports to developing countries grew at a rate of 21%, but accounted for only a third of total exports. Concerns about health and increased consumption of alternative foods (e.g., other fruits and vegetables) in developed countries are likely to decrease the demand for potato products. However, per capita consumption of potatoes is low but increasing in many developing countries.

The emerging markets may prove to be a potential source of future export growth for U.S. frozen potatoes, and key factors such as an importing country's market size, economic development, trade openness, and macroeconomic stability will likely determine the growth potential of the global frozen potato industry in the coming years. Clearly, differences between developed and developing countries are important considerations when assessing the global market place for U.S. exports in frozen potato products. In the case of developing countries, for example, the per capita income is positively related to U.S. frozen potato exports, implying the likely potential for further growth. In the case of developed countries, a negative association is found between per capita income and U.S. exports of frozen potato products, suggesting market maturity and saturation.

Several developing Asian countries including China, India, Indonesia, Malaysia, the Philippines, and Thailand, along with the Latin American countries of Chile, Brazil, and Mexico, are poised for significant economic growth in the next decade. These emerging markets have a combined urban population of over one billion, with a PPP-adjusted GDP of over $11 trillion. Additionally, these economies are growing faster relative to developed country markets. Not only are growth rates of GDP and per capita income higher in developing countries, but also their food demand is more income-elastic. Producers of frozen potato products are likely to face increased demand as the demand for fast food rises in these countries.

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