Consolidation, Economies of Scale, and the Heckscher-Ohlin Theory of Trade-An Empirical Analysis of U.S. Meat Processing Industry

by

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I. Introduction

This paper empirically examines the recent trade situation of the U.S. meat processing industry to see to what extent it corresponds to trade theory. The U.S. processed food industry has experienced phenomenal growth in trade in the past 15 years. Since 1991, the value of exports has grown 55 percent, while imports grew 21 percent. The meat processing industry has been the major contributor to the export growth of traded U.S. processed food. U.S. exports of three major meats - beef, pork, and poultry- totaled $6.5 billion in 1998 (calendar), compared with $2.8 billion in imports. During 1993-95, U.S. exported $79 billion of processed food of which meat and poultry products accounted for 27 percent [9].

Exporting meat involves animal production, slaughter, processing and shipment to the port. As meat and poultry products move through various processing channels toward overseas destinations, they become value-added products whether sold as carcass beef, as boxed beef, or as chicken leg quarters. Each of these products requires additional levels of employment and raw materials. The 1990's gain in processed food products trade has led to a gain in related employment as well, particularly a gain in demand for unskilled labor, mostly in rural areas as meat processors move their plants closer to animal production. As slaughtering, processing, and distribution are more consolidated in rural areas, some rural-based meat packers operated their packing plants by hiring low-skilled foreign workers due to a shortage of low-skilled workers in rural areas. Rural policy makers who welcomed the relocation of packing plants to rural areas may not have expected this phenomenon.

During the 1972-92 period, U.S. international trade in meat products resulted in gains in employment, particularly for low-skilled labor in rural areas. How can we explain the fact that U.S. exported meat products that were relatively low-skilled rural labor intensive when U.S. is not relatively well endowed with rural low-skilled labor? What explains the phenomenon of growing trade for the meat processing industry with production practices that appear to demand a relatively scarce factor, low-skilled labor? How about the low-skilled labor content of trade? .

II. What Does the Heckscher-Ohlin Trade Theory Say on This Development?

A core prediction of the Heckscher-Ohlin (H/O) theory is that countries specialize in production of goods in which they have a comparative advantage, and that the differences in relative factor supplies provide comparative advantage [2]. In his recent review of trade theory, Helpman [3] offers a theoretical specification of Ethier's 1984 argument that there are two types of relationships that could provide the underpinning for an analysis of the generalized H/O theory. The first set of relationships involves production and the second set comes from consumption. That is, each country's production of any good is determined by its primary factor endowments, while each country's consumption of goods is determined by overall spending. Exports will be those products where the country produces more than it consumes. Thus exports are part of the country's production. Imports, on the other hand, will be those products of which the country produces less than it consumes and therefore, is determined by overall spending.

For example, let a_{ij} represent the quantity of input i used in the production of one unit of output j. Under the H/O theory, these coefficients depend upon a particular country's technology, which is assumed to be constant and the same everywhere and factor prices,

which are assumed to be equalized across countries. Let V^k_i represent the quantity of input i in country k. Similarly let X^k_j represent the output of good j in country k. Then, full employment of resources implies:

[**1**] $\sum_j a_{ij} X^k_j = V^k_i$ for all inputs i and all countries k.

The second set of relationships comes from consumption. If we denote s^k the share of country *k* in consumption, then consumption of good *j* in country *k* is given by:

[**2**] $C^k_j = s^k X_j$, where X_j is aggregate world output of good *j*.

These two sets of fundamental relationships imply empirical specifications. Each country's production of any goods is determined by its factor endowments, while each country's consumption of goods is determined by overall spending. In equilibrium, however, production (supply) equals spending (demand). Therefore, to examine the H/O theory empirically, we need to have data in terms of this market-balancing equilibrium concept. The U.S. Input-Output (I/O) tables provide the most comprehensive data set in terms of this market-balancing equilibrium concept.

There are two concepts of trade in the H/O theory; trade in goods and embodied factor content in trade. Trade in goods is standard; meat products are goods. Embodied factor content in trade refers to the inputs that are embodied in exports and imports. Using this approach one can calculate the factor content of exports, imports, and the factor content of net trade. Our method of calculating the factor content of international trade relies upon Leontief's input-output (I/O) model, which continues to be a standard method for analyzing the H/O factor content of trade. The U.S. I/O model, which also assumes fixed technical relationships, mirrors the H/O assumptions of fixed technical relationships between outputs and inputs. The methodology used has been applied for a study in trade

and skilled vs unskilled labor demand [4] and in identifying change in rural unskilled labor demand to produce meat exports [10]. Recently, Panagariya [8] made a comprehensive analysis of the factor content approach to measuring the effect of trade on wage inequality. When analyzing the effect of trade on domestic factor demand, U.S. I/O technical and factor usage coefficients also apply to imports and we don't need to know s^k in equation [2]. I/O tables provide U.S. imports of various goods and services and we estimate the factor content of imports as the factors that would have been used if the imported goods were produced domestically.

First, we calculate the equilibrium output of each sector of the economy, for a given set of final demand of goods and services, in a matrix form by:

$$[3] \quad \mathbf{X} = \boldsymbol{A}\mathbf{X} + \boldsymbol{F}.$$

In our empirical analysis, **X** is an 80 by 1 vector of sectoral output, X^k_j in equation [1], ***A*** is an 80 by 80 I/O direct requirements matrix of a_{ij} in equation [1], and ***F*** is an 80 by 1 vector of aggregate final demands consisting of aggregates of vectors of: household consumption (**C**), inventory change and gross private domestic investment **(I)**, government purchases of goods and services (**G**), and net trade (**Nt** = exports - imports). The equilibrium output levels needed to satisfy final demand ***F*** are:

$$[4] \quad \mathbf{X} = [\ \mathbf{I} - \boldsymbol{A}\ ]^{-1} * \boldsymbol{F}$$

$$= \ [\ \mathbf{I} - \boldsymbol{A}\ ]^{-1}\ [\mathbf{C}+\mathbf{I}+\mathbf{G}+\mathbf{Nt}].$$

The equilibrium output to satisfy net trade, $\mathbf{X_t}$, and domestic use, $\mathbf{X_d}$, can be obtained by replacing ***F*** with ***Nt*** for net trade and **D** (**D**= **C**+**I**+**G**) for domestic use, such that;

$$[5] \quad \mathbf{X} = \mathbf{X_t} + \mathbf{X_d},$$ and factor demands are estimated by the generic relationships,

$$[6] \quad \mathbf{L_{nt}} = \boldsymbol{dl}*\mathbf{X_t},$$ for net trade, and

[7] $\mathbf{L_d} = \boldsymbol{dl}*\mathbf{X_d}$, for domestic use**,**

where ***dl*** is an 80 by 80-diagonal matrix of labor, land, and capital coefficients (required per unit of output in each industry) . Thus, $\mathbf{L_{nt}} + \mathbf{L_d}$ is the total labor employment, land and capital used in the U.S. economy for a particular year. Note here that through Leontief's multiplier effects,

$[\ \mathbf{I} - \boldsymbol{A}\ ]^{-1}$, we not only estimate direct factor content of trade but also indirect factor content of trade as well. We also specify labor as high-skilled and low-skilled labor using the nine major occupational categories of U.S. workers as classified by the Bureau of Labor Statistics [12]:

> "The nine major categories are: (1) Executive, administrative managerial; (2) Professional; (3) Technicians and related support; (4) Sales occupations; (5) Administrative support; (6) Precision production, craft & repair; (7) Service occupations; (8) operators, fabricators & Laborers; and (9) Farming, forestry, and fishing."

We combined occupational categories and defined category (1) through (3) as high-skilled and (4) through (9) as low-skilled. We used this classification but found our results robust to alternative occupational groupings into high-skilled and low-skilled. The grouping of nine occupational labor categories into high-skilled and low-skilled labor allowed us to estimate the amounts of high-skilled and low-skilled labor embodied in U.S. exports. The grouping also allowed us to estimate the amount of high-skilled and low-skilled labor that the U.S. would need if the goods and services imported were produced domestically.

Our second estimation is the change in ratios of high-skilled to low-skilled labor demand between 1972 and 1992. This estimation shows how the factor content of trade and domestic use changed over time under different labor productivity, I/O technology,

and final demand situations. The resulting estimation reflects an interactive effect of labor productivity, direct requirement of intermediate inputs, and final demand. Data availability influenced the selection of the years; 1972 was the first year and 1992 was the last available year that BEA/USDC constructed an official U.S. I/O tables using the SNA (System of National Accounts) Make and Use tables.

Our third estimation is the skill intensity of trade. We define the skill intensity of trade as:

$$[8]\quad SI = \frac{S_e}{S_m} = \frac{\sum_i \sum_j s_i r_{ij} e_j}{\sum_i \sum_j u_i r_{ij} e_j} \div \frac{\sum_i \sum_j s_i r_{ij} m_j}{\sum_i \sum_j u_i r_{ij} m_j}$$

Where; S_e = ratio of high-skilled workers to low-skilled workers in exports,
$S_{m.}$ = ratio of high-skilled workers to low-skilled workers in imports,
s_i = high-skilled workers-output ratio in sector *i*,
u_i = low-skilled workers-output ratio in sector *i*,
r_{ij} = *i*th row, *j*th column element of the total requirements matrix, $[\,\mathbf{I} - \boldsymbol{A}\,]^{-1}$,
e_j = *j*th sector exports,
m_j = *j*th sector imports.

In equation [8], the numerator measures the ratio of high-skilled workers to low-skilled workers for the production of output necessary to support export demands, while the denominator measures the ratio of high-skilled workers to low-skilled workers for the production of output which would be required to replace imports. Therefore if SI is greater than unity, exports are skill intensive relative to imports. As measured by equation 8, skill intensity of trade depends upon sectoral employment, sector high-skilled and low-skilled employment patterns, interindustry structure, and sectoral patterns of foreign trade.

Finally, we generate estimates of urban and rural employment by using the CBP (County Business Pattern) matrix as:

$$[\mathbf{9}] \quad R = d\,\mathbf{L_{nt}}*C$$

where, R is 80 by 102 matrix of urban and rural employment of 80 sectors (in the row) for 50 states and the District of Columbia (in the column), d $\mathbf{L_{nt}}$ is a diagonal matrix of $\mathbf{L_{nt}}$, and C is a 80 by 102 matrix of rural employment share coefficients derived from the *County Business Pattern* (Bureau of Census, various issues). We use the results of equation 9 to estimate urban and rural employment due to trade.

III. Empirical Analysis of Factor Content of Trade

We now concentrate our analysis of factor content of trade on the trade-related demand for high-skilled and low-skilled labor in meatpacking and poultry sectors of the food processing industry for 1972-92. We do this to explore the contrasting results in employment due to trade. Our measures of the factor content trade will be: (1) economywide high-skilled and low-skilled labor commitment to produce meat and poultry products to meet export and import demand, (2) the change in ratios of high-skilled and low-skilled labor demand, (3) the skill intensity of trade, and (4) finally, impacts on urban and rural employment. When comparing employment embodied in exports with the domestic employment equivalent of imports as a measure of the employment effect of net trade, similar employment requirements for exports and imports and a negative trade balance yields a negative employment effect of trade. Differing sectoral trade balance and differing sectoral employment requirements can yield differing sectoral effects of net trade.

During 1972 to 1992, net trade increased employment in the meat processing industry. Export related employment in meat processing sectors increased substantially (271.3%), from 8,700 in 1972 to 32,300 in 1992 (Table 1). Rural areas clearly benefited from this

trade increase. The meat export-related rural employment increased 437.1% (from 2,981 in 1972 to 16,011 in 1992), substantially more than urban employment that increased (185%); from 5,719 to 16,289 during the period. Import related employment losses were only up 27.6 % (from 18,100 to 23,100) with rural employment absorbing most of the job loss, a 99% increase, from 5,127 to 10,203 jobs. The contrasting results for the industry presented in the table portrays a paradox for trade theory that we investigate. The industry is low-skilled labor intensive and more rural based yet the meat processing industry moved to be a net exporter.

Table 2 presents skill intensity of trade that we estimated using equations 6, 7, and 8 and the trade related employment situations in more detail for meat and poultry sectors. The key statistics in Table 2 are in the last row, Skill Intensity (SI from equation 8). When skill intensity is less than one it indicates that a sector's exports used a lower ratio of high to low skilled workers than for its imports. For poultry processing, the skill intensity of trade fell from 1972 to 1992.

As always when analyzing results of changes from a base with both large and small numbers, it is best to look at both level changes and percentage changes. The changes in level of employment between 1972-92 sometimes tell a different story than the percentage changes during the period. For example, the high skilled and low skilled rows for exports show that the meatpacking sector's employment due to exports increased 266.7% for high skilled labor and 196.9 for low-skilled labor, suggesting high skilled labor benefited more. However, the need for low skilled jobs grew more. The level of employment changes were 800 for high-skilled and 12,600 for low skilled. For the poultry sector the level of increase in high-skilled labor was 600 (600%) but low-skilled

labor increase was 9,600 (505.3%). For meat processing and poultry sectors, changes in the product mix of trade led to most changes in trade related employment. For example, in 1972, the skill requirements for processed meat production for trade was already more low-skilled labor intensive than food processing in general and grew slightly more so in the next twenty years. The shift of processed meat production from urban to rural areas during the 1972-1992 period made rural areas the primary beneficiary of this shift.

Although they are clearly interrelated, we find the phenomenon of changes in skill intensity can be often explained more by changes in processed meat and poultry trade than in sector production practices. That is: (1) the change was due to a shift in the product mix of trade, particularly greater exports for meat products, and, (2) processed meat trade continues to be more reliant upon low-skilled labor.

The growth in low-skilled employment needed for exported meats paralleled a spatial shift of the sectors from urban to rural locations. Because on balance, rural areas have a greater share of low-skilled workers in their labor force and persistently higher unemployment rates, the shift may appear to be beneficial for rural areas. Often, however, there were not enough low-skilled workers available in rural areas. As a result, a large immigrant workforce met this need, changing the age and racial/ethnic composition of some rural communities. Our estimates of the embodied low-skilled labor content of meat trade suggest a reason that meat processing industry moved. Seeking to find their needed low-skilled labor at less cost, they moved from urban to rural areas.

Harvested cropland intensity estimates presented in Table 3 suggest that the low-skilled labor content of meat trade is not the explanatory factor intensity explaining

the differing world trade experience of the two sectors during 1972 and 1992. For example, for the same constant dollar value of final output, meat products need about 10 times as much harvested cropland as textile products. The United States abundant farmland compared to many of the developing nations probably assures it will retain its prominent role in world meat trade, i.e. it is easier for the U.S. to supplement its supply of unskilled workers, than for other nations to supplement their supply of arable farmland. But cropland intensity of production and abundant U.S. farmland is not the whole story. That situation did not changed that much between 1972 and 1992, while the trade fortunes of these two sectors brightened. We now explore more of the story.

IV. Consolidation and Economies of Scale in Meat Processing Industry

The U.S. meat processing industry has a comparative advantage in meat production because, (1) the U.S. has advantage in abundant farmland relative to importing countries, (2) feed production is not as limited as importing countries, and (3) U.S. meat packers are consolidating and can exercise to achieve economies of scale. Both MacDonald, et al. [5,6] and Ollinger, et al. [7] document that U.S. meat processing industry has been consolidating which has resulted in economies of scales leading to the ability to deliver meat products with lower prices, in real terms, to the world. In addition, lower trade barriers in countries like Japan and changes in consumer demand in favor of U.S. meat products in countries like Korea have increased U.S. meat exports allowing processing plants to operate nearer to capacity and thereby more fully realize their economies of size.

"The growth in exports (of chicken and turkey) was a sharp change from the past. As recently as 1975, the export market amounted to no more than 200 million pounds and had never been more than 5 percent of production. However, exports doubled in 1976 from 1975 levels and grew each year through 1981… Since 1984, exports have increased

every year, reaching 4.7 billion pounds and 17 percent of production in both 1997 and 1998." [7: p.8]

U.S. exports of red meat and poultry products (in physical terms) increased 62 percent and 119 percent from FY1993 to FY2000 (Table 4). Ignoring the PRC to which U.S. export actually started in fiscal year 1990/1991 and the variable Russian trade, South Korea's imports of U.S. red meat and poultry products during this period grew most, 117 and 397 percent (in physical terms) respectively. Lowered trade barriers allowed income increases in these countries to lead to increased spending for US meat products. Through consolidation, the meat processing industry created economies of scale in plant operations for which increased exports allowed fuller utilization.

The economies of scale of meat processing operation through consolidation play a crucial part in meat processing trade. For example, Ollinger, et al [7:pp. 29] estimated that the common measure of economies of scale, elasticity of total cost with respect to outputs of poultry, cattle, and hog slaughter as 0.901, 0.953, and 0.926. These elasticities are interpreted as a percent increase in output at constant factor prices associated with a percent increase in total cost. When these are less than one, costs increase slower than output, i.e., declining average costs. These estimates of elasticities of total cost of less than one suggest that while economies of scale exist in the meat processing industry, the poultry industry has larger economies of scale.

The meat processing industry consolidated rapidly during the last two decades. Far fewer meatpackers now slaughter livestock, but their plants are much larger. Today four firms handle nearly 80 % of all steer and heifer slaughter [6: pp.1]. Changes in slaughter plant technology may have created scale economies, altered the mix of slaughter plant products, and changed the location and operation practices of cattle and

hog production. In addition, industry consolidation has been accompanied by important changes in labor relations in meat processing. For example, "in 1980, 46 percent of workers in the meat products industry were union members but by 1987, union membership had fallen to 21 percent of the workforce, and has remained at that lower level through 1997" [6:pp.14-15]. Furthermore,

> "Declining unionization coincided with changes in slaughter plant demographics. Immigrants, primarily from south Asia, Mexico, and Central America, make up large and growing shares of the workforces at both hog and cattle slaughter plants. This has led to striking transformation in the rural communities that must provide schooling in the rural communities to the workers and their families." [6:pp.15]

Hog production has also undergone a dramatic and ongoing consolidation, represented by a shift toward larger production establishments and toward long-term contractual arrangements among the production stages and between production and slaughter. Just two decades ago, concentration was less than half as high for hog slaughter, but has increased since and now the top four firms handle over half of all slaughter. In 1978, 96 percent of all hog farms sold less than 1000 head and together sold two-third of all hogs. By 1997, 77 percent of all hog farms sold less than 1000 head, but together accounted for only five percent of marketings. The very large farms, those selling more than 50,000 head a year, handled 37 percent of all hog marketings in 1997, up from seven percent a decade before [5]. Very large hog producers are highly specialized; purchasing feed rather than growing it, and frequently linked to slaughterhouses through contractual agreement or common ownership. With hog production increasingly divorced from corn and soybean production, large operations moved outside of the traditional region of hog production-the Corn Belt states of Minnesota, Iowa, and Illinois- to the newly emerging southeastern hog production region and Oklahoma. [6: pp. 6] Slaughterhouses have

always been risky places to work and, today large work forces of immigrant workers operate slaughter and fabrication lines.

Substantial scale economies in the poultry industry have also reduced the real costs of chicken and turkey production in the U.S. Ollinger, et al [7] report that the real price (after adjusting inflation) of chicken and turkey has been reduced over 50 percent during the 1963-97 period and these scale economies have led to a number of structural changes. The share of production in slaughter plants with more than 400 employees grew from less than 30 percent in 1963 to more than 80 percent in 1997. This consolidation is likely to continue.

Dyck and Nelson [1] reported that the U.S. was able to actively negotiate with Japan for a share of Japan's beef imports following the dismantling of its quota system for beef imports and reductions in tariffs since 1995. South Korea opened its beef market with an import quota in 1988 and subsequently has raised the quota level several times [1]. Regional trade agreements (RTA's) that have become a fixture in the global trade area and for the multinational trade liberalization [11] have also contributed increasing trade among member countries.

In sum, the U.S. meat processing industry has: (1) a comparative advantage in the disease control for meat production, (2) labor costs relatively lower than importing countries, (3) economies of scale that has lowered the cost of meat processing and distribution, and (4) a transportation system which has improved to better supply fresh and chilled meat to many overseas markets. In addition, the growth of consumer preference for high quality beef (grain fed) in importing countries helped the growth of the U.S. meat processing industry.

VI. Conclusions

We used an I/O based economic model to examine the land and labor intensity of trade and particularly the skill intensity of domestic labor used directly, indirectly, or implicitly in the meat processing industry. The industry continues its relatively high need for low-skilled labor and tendency to locate in rural areas. Following developments in the U.S. labor forces, the U.S. meat processing industry used a slightly higher ratio of high skilled to low-skilled workers in 1992 than in 1972. The continued reliance on low-skilled labor in meat processing industry paralleled a spatial shift of the meat processing industry from urban to rural locations. Because on balance rural areas have a greater share of low-skilled workers in their labor force and have persistently higher unemployment rates, this may appear to be a win-win situation for rural areas. Because meat production is cropland intensive, the U.S. meat processing industry maintains a comparative advantage because the U.S. has an advantage in abundant farmland relative to importing countries, feed production is not as limited as in importing countries and the U.S. industry has been able to reduce cost because of economies of scale. The United States' factor endowment favors production of meat products and increased export since the U.S. can produce more than what it can domestically consume. Increasing demand in the rest of the world helps our comparative advantage in meat processing production since production for export helps the industry more nearly operate at optimal capacity.

Meanwhile, many third world, particularly Asian, countries feel that they do not have a comparative advantage in producing meat and poultry products because they can't compete in the international markets with land abundant countries and countries which

can reduce costs by taking advantage of opportunities from consolidation and economies of scale.

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Table 1. Changes in Trade Related Employment, 1972-92
Meat Packing and Poultry Processing

	1972		1992		percent change
	workers	share	workers	share	%
Exports	8,700	100	32,300	100	271.3
Urban	5,719	65.7	16,289	50.4	184.8
Rural	2,981	34.3	16,011	49.6	437.1
High-skilled	400	4.6	1,800	5.6	350
Low-skilled	8,300	95.4	30,500	94.4	267.5
Imports	18,100	100	23,100	100	27.6
Urban	12,973	71.7	12,897	55.8	-0.6
Rural	5,127	28.3	10,203	44.2	99.0
High-skilled	1,000	5.5	1,200	5.2	20
Low-skilled	17,100	94.5	21,900	94.8	28.1

Table 2. Skill Intensity of Trade for Meat Packing and Poultry Processing, 1972 and 1992.

	Meat Packing				Poultry Processing			
	1972 workers	1992 workers	Change	Change %	1972 workers	1992 workers	Change	Change %
Total Trade-related	23600	40100	16500	69.9	3200	16500	13300	415.6
Exports	6700	20100	13400	200.0	2000	12200	10200	510.0
High-skilled	300	1100	800	266.7	100	700	600	600.0
Low-skilled	6400	19000	12600	196.9	1900	11500	9600	505.3
High/Low	0.047	0.058	0.011	23.5	0.053	0.061	0.008	15.7
Imports	16900	20000	3100	18.3	1200	4300	3100	258.3
High-skilled	900	1100	200	22.2	100	500	400	400.0
Low-skilled	16000	18900	2900	18.1	1100	3800	2700	245.5
High/Low	0.056	0.058	0.002	3.5	0.091	0.132	0.041	44.7
Skill intensity	0.833	0.995	0.161	19.4	0.579	0.463	-0.116	-20.1

Table 3. Acres of Harvested Cropland Needed per million dollars of output ($1987).

	1972	1992
Meat packing	1868	1273
Poultry Processing	1169	551
Textiles	200	137
Apparel	91	48

Table 4. U.S. exports of red meat and poultry products to the world and major customer countries, metric tons , Fiscal years 1992-2000.

Red Meat									Percent change
Country	FY1992-1993	FY1993-1994	FY1994-1995	FY1995-1996	FY1996-1997	FY1997-1998	FY1998-1999	FY1999-2000	FY1993-FY2000
WORLD	1,160,177	1,316,574	1,632,945	1,866,778	1,822,729	2,063,796	2,061,328	1,880,367	62
CANADA	134,399	154,311	173,504	184,822	198,292	218,110	200,711	163,062	21
MEXICO	285,359	315,054	255,440	254,806	313,354	417,998	449,180	377,153	32
RUSSIA	2,194	44,408	129,920	126,652	163,050	169,495	31,094	123,499	5,528
CHINA (MAINLAND)	628	2,559	4,060	8,043	34,233	46,731	56,013	89,299	14,127
SOUTH KOREA	59,194	73,717	119,587	108,651	115,083	71,255	129,910	128,193	117
JAPAN	452,149	469,521	602,823	762,055	609,304	699,864	717,779	587,933	30
Poultry									
WORLD	985,989	1,377,104	1,910,534	2,342,579	2,553,293	2,662,824	2,376,757	2,156,206	119
CANADA	67,138	58,256	60,475	68,243	76,114	96,170	100,138	82,599	23
MEXICO	163,494	178,537	168,345	168,553	203,025	231,858	238,275	199,651	22
RUSSIA	42,632	315,319	625,220	910,172	1,000,082	908,784	225,988	427,339	902
CHINA (MAINLAND)	23,891	29,752	43,639	72,390	73,998	58,846	67,833	70,214	194
SOUTH KOREA	12,478	15,434	25,374	22,245	19,335	11,220	48,587	61,978	397
JAPAN	123,497	122,051	132,390	130,404	112,315	108,355	113,800	81,477	-34