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## Livestock, Dairy and Poultry Outlook: Special Article

# Determinants of Japanese Demand for U.S. Pork Products in 2012

Mildred Haley  
[mhaley@ers.usda.gov](mailto:mhaley@ers.usda.gov)

...Approved by the  
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In 2012, the United States exported almost 5.4 billion pounds of pork products to 113 countries. Of all those countries Japan was by far the largest foreign destination for U.S. pork, as it has been for decades. Last year Japan accounted for over 25 percent of U.S. export volume and over 34 percent of the total value. Even so, Japanese imports of U.S. pork fell almost 7 percent year-over-year in 2012, to 1.4 billion pounds. While such declines are not rare—U.S. exports to Japan have fallen, year-over-year, six times in the last 24 years—lagging Japanese demand for U.S. pork tends to slow total U.S. pork export growth and to create uncertainty with respect to pork export growth potential going forward.

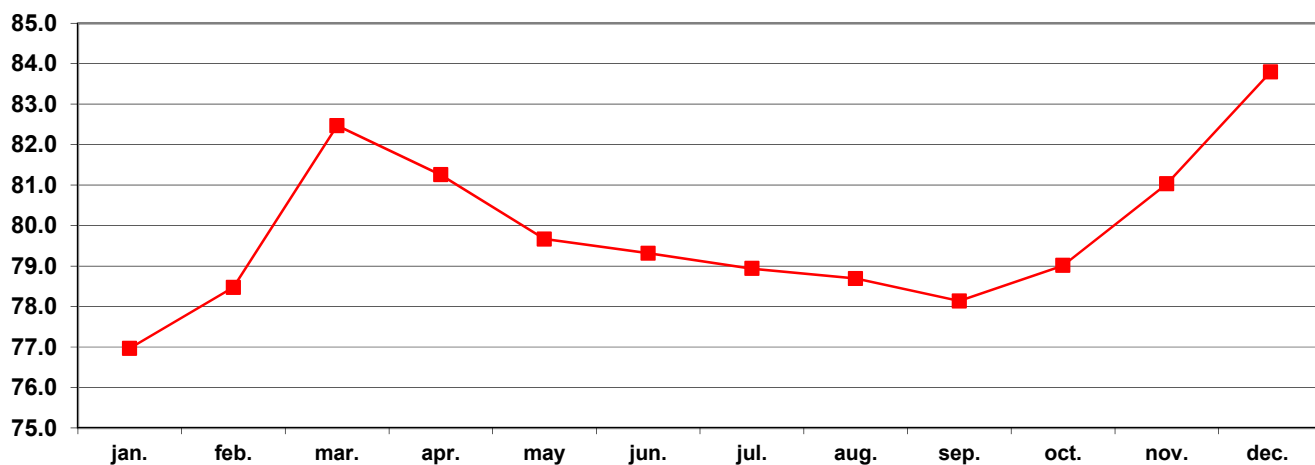
This article examines price and supply variables from 2012 to identify factors that may explain why Japan imported fewer U.S. pork products. Japanese data suggest that two factors in particular—a depreciating yen and increased Japanese pork production—likely explain most of the decline in Japanese demand for U.S. pork last year.

### *Yen-U.S. Dollar Exchange Rate Dynamics in 2012*

The figure below shows the monthly yen-U.S. dollar exchange rate in 2012. The data show that the yen generally weakened last year. It was strongest in January when it cost 77 yen to purchase one U.S. dollar, and throughout the year the yen never strengthened beyond its January level. In December 2012, the exchange rate was 83.79 yen per U.S. dollar, making the yen about 9 percent weaker than at the start of 2012. Increases in the yen price of U.S. dollars such as those in 2012 likely influenced the quantity of U.S. pork products that Japanese importers buy. All else equal, a depreciated yen would incline Japanese buyers to reduce purchases of U.S. pork products.

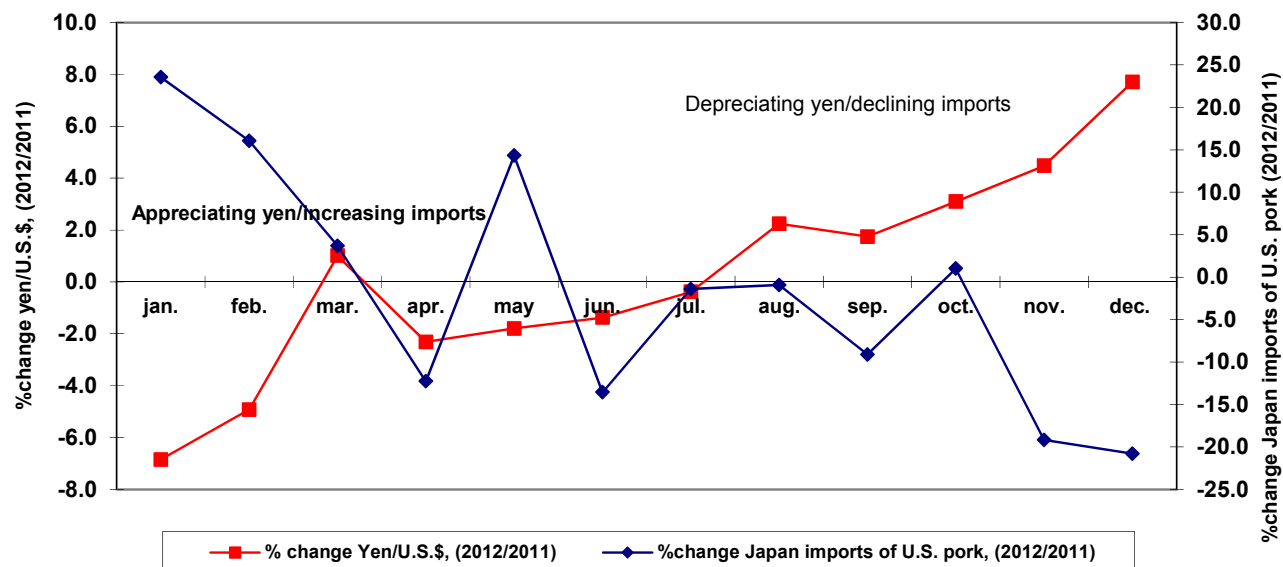
The correspondence between changes in the yen-U.S. dollar exchange rate and Japanese imports of U.S. pork products in 2012 is illustrated in figure 2.

**Figure 1. Yen-US dollar exchange rate, monthly, 2012**



Source: Board of Governors of the Federal Reserve System: <http://www.federalreserve.gov/releases/h10/current/>.

**Figure 2. Year-over-year (2012 / 2011) percent changes: yen per U.S. dollar and Japan imports of U.S. pork**



Source: Board of Governors of the Federal Reserve System. <http://www.federalreserve.gov/econresdata/statisticsdata.htm>; Global Trade Atlas.

The figure shows how a depreciating yen largely corresponds to declines of Japanese imports of U.S. pork products, while an appreciating yen tracks larger Japanese imports. Specifically, the figure shows percent changes—year-over-year—of monthly yen-U.S. dollar exchange rates (red line, read from the left-hand axis) and percent changes in monthly quantities of Japanese imports of U.S. pork products (blue line, right-hand axis). When the line representing percent change in yen per dollar appears below the zero line, the yen price of one dollar is below a year-earlier: the yen has appreciated. When the red line is above the zero line, more yen are necessary to buy one dollar; i.e., the yen has depreciated. The same dynamic is true for the blue line, which represents the year-over-year percent change in monthly Japanese imports of U.S. pork. When the blue line is above the zero line, 2012 imports are above a year earlier. Blue line values below the zero line indicate that 2012 imports are lower than in the same period of 2011. In the figure, an appreciating yen corresponds to year-over-year larger Japanese imports of U.S. pork products, in January and February in particular. A depreciating yen, between July and December, corresponds with a period largely characterized by year-over-year declines in Japanese imports of U.S. pork.<sup>1</sup>

A more complete analysis of the relationship between the yen-U.S. dollar exchange rate and Japanese import demand for U.S. pork products between 2004 and early 2013 is summarized in the table below. While the graphical analysis above shows a rough correspondence, the time series analysis indicates that the two variables are cointegrated. That is, for the period examined, there exists a long-run equilibrium relationship between the yen price of a U.S. dollar and Japanese imports of U.S. pork. Although deviations can be observed between cointegrated variables in the short- and medium- term, partial short-run adjustments are present that return the variables to their underlying equilibrium relationship.

Table 1 -- Times series properties of monthly Japanese pork imports from the United States and yen/dollar exchange rate, 2004-2013

Dickey-Fuller Unit Root Test: Test for Stationarity

	Statistic	Critical Value			Note
		10%	5%	1%	
<b>Levels</b>					
Pork imports 1/	-1.48334	-2.58104	-2.88816	-3.49134	Do not reject: Pork import variable has unit root.
Yen/dollar exchange r	-0.88975	-2.58091	-2.88791	-3.49077	Do not reject: Exchange rate variable has unit root.
<b>First Differences</b>					
Pork imports 1/	-4.67662 ***	-2.58104	-2.88816	-3.49134	Reject: first difference of import variable has unit root
Yen/dollar exchange r	-8.4914 ***	-2.58091	-2.88791	-3.49077	Reject: first difference of ex-rate variable has unit root

Johansen's Cointegration Rank Test,  $\lambda$  max Test Statistic

H0: r = 0, H1: r = 1	20.39544 **	20.26184	Reject hypothesis of no cointegration
H0: r = 1, H1: r = 2	1.89526	9.164546	Do not reject hypothesis of no more than one cointegrating relationship

Note: \* = .10 level (10%) \*\* = .05 level (5%) \*\*\* = .01 level (1%)

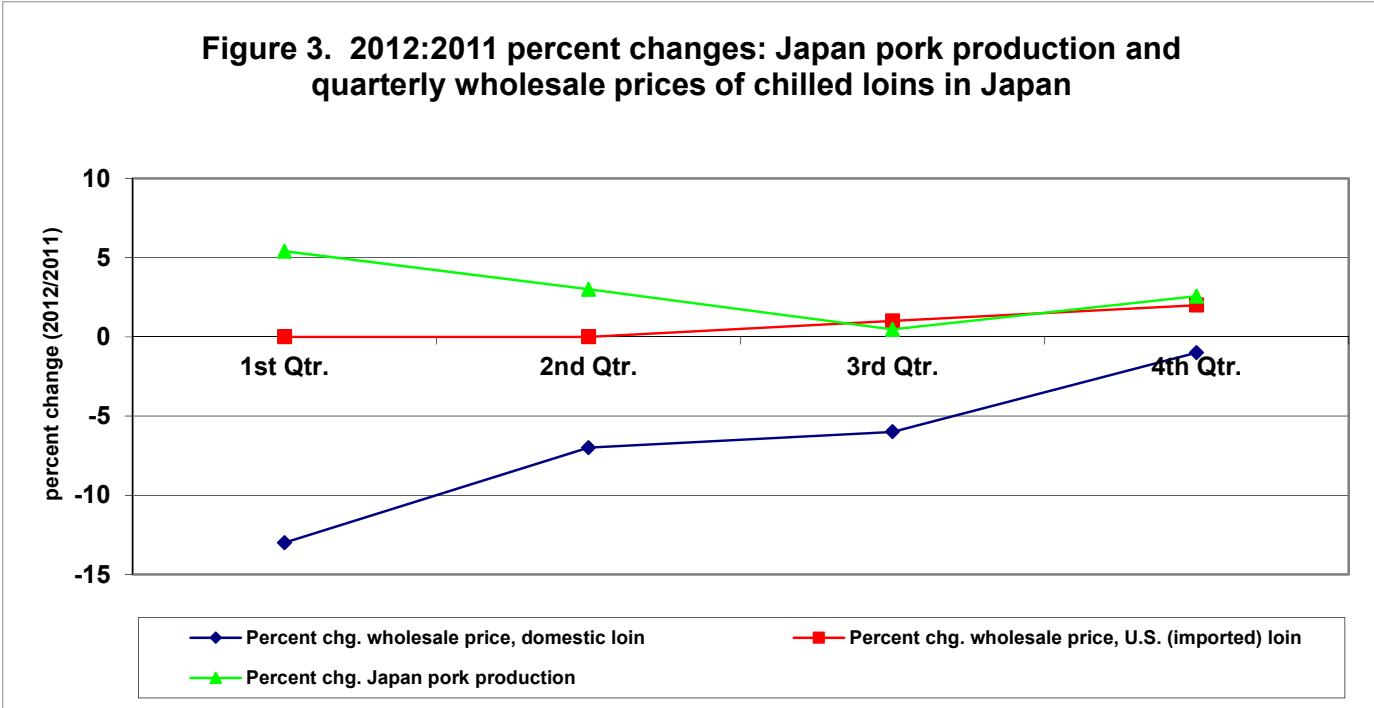
1/  
2/  
Source: Pindyck and Rubinfeld. *Econometric Models and Economic Forecasts*. 1998, and Haley, Stephen L. "Forecasting World Raw Sugar Prices: The Influence of Brazilian Costs of Production and World Surplus/Deficit Measures". ERS, *Sugar and Sweetener Outlook*, 2013.

Both models for the DF test include a constant term, but not a trend. The null hypothesis of the DF test is that the variable is not stationary, i.e. it contains a unit root.

The cointegrating vector in Johansen's test includes a constant but not a trend term. The SIC was used to determine lag lengths. The  $\lambda$  max statistic tests the null hypothesis that the number of cointegrating vectors is zero ( $r = 0$ ) against the alternative of one cointegrating vector ( $r = 1$ ). If this null hypothesis is rejected, the presence of one cointegrating vector ( $r = 1$ ) is tested against the alternative of two ( $r = 2$ ). The  $\lambda$  max test supports the presence of one cointegrating vector between pork imports and the exchange rate.

In addition to exchange rate depreciation last year, Japanese import demand for U.S. pork was likely affected by more than adequate supplies of domestically produced pork. Japanese pork production increased in 2012 for the first time since 2009. Last year’s production increased by almost 3 percent compared with 2011. These production increases appear to be reflected in changes of Japanese wholesale pork prices last year.

Figure 3 shows how quarterly production increases last year (shown in green) correspond with price declines of wholesale prices of domestic loins (shown in blue). By contrast, yen prices of imported U.S. chilled loins (in red) were year-over-year steady in the first and second quarters and increased in the third and fourth quarters when the value of the yen was depreciating. The magnitude of the price declines of Japanese chilled loins, relative to the imported American cut, likely made these products more attractive to Japanese consumers, who are known to demonstrate strong preferences for domestically produced pork.



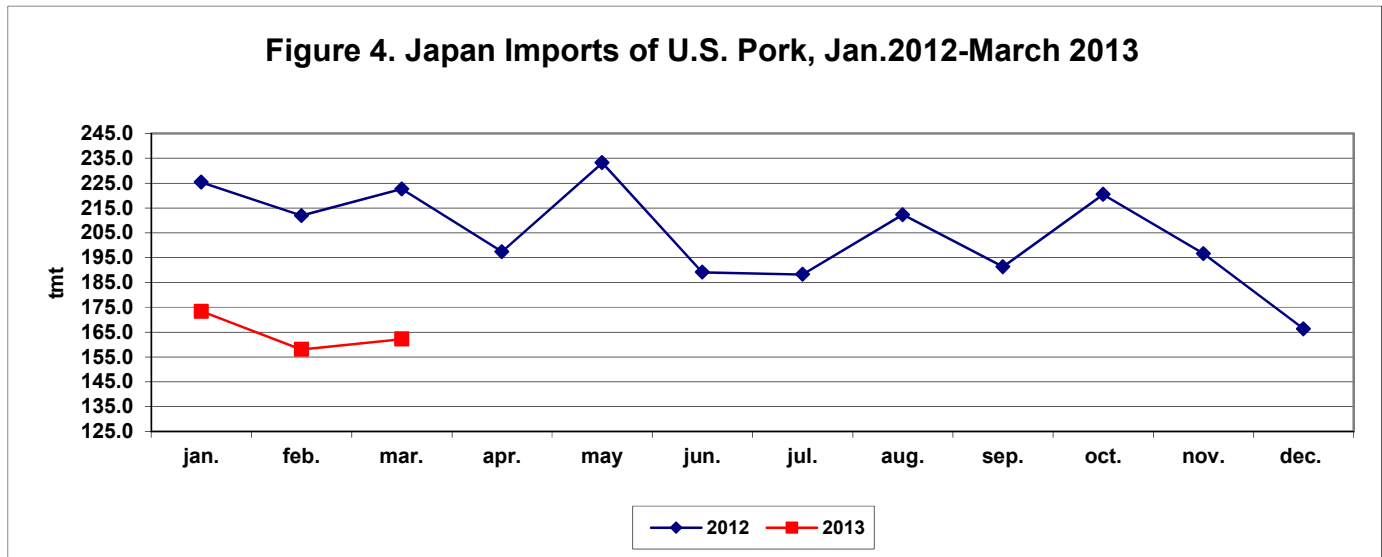
Source: “Japan: Livestock and Products Semi-Annual”, USDA/Foreign Agricultural Service  
[http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Livestock%20and%20Products%20Semi-annual\\_Tokyo\\_Japan\\_3-1-2013.pdf](http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Livestock%20and%20Products%20Semi-annual_Tokyo_Japan_3-1-2013.pdf).

### The 2013 Situation Thus Far

USDA's Foreign Agricultural Service recently published new trade and production forecasts for major trading countries. Japan's total 2013 pork imports are forecast at 1.23 mmt, down more than 2 percent from 2012. Japan's pork production is forecast to increase almost 1 percent this year. <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1488>.

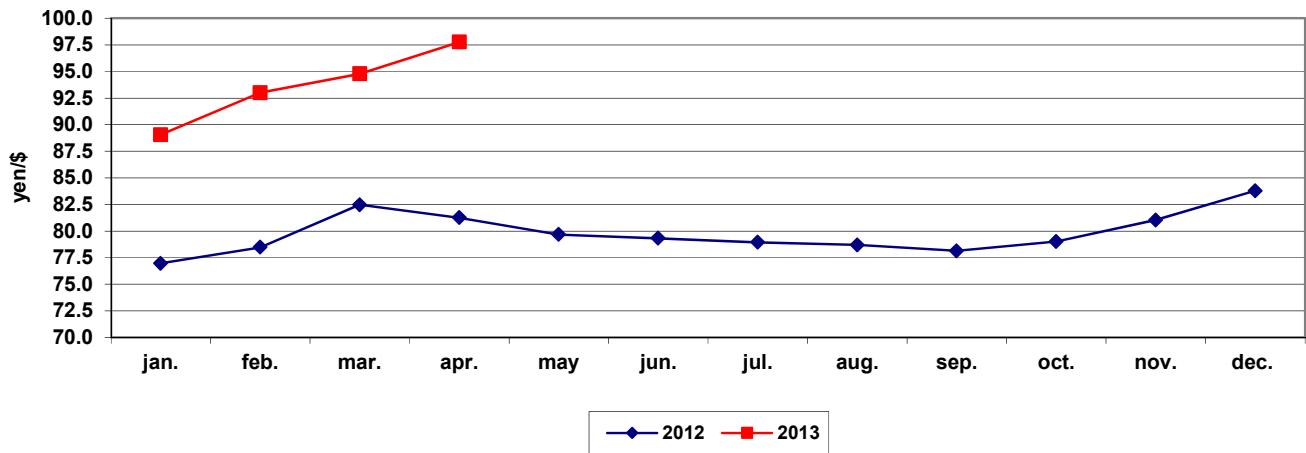
Consistent with the FAS trade forecast, U.S. pork exports to Japan have had a rough start in 2013. Japanese pork import data for January-March are shown in figure 4. Imports for the 3 months combined are more than 25 percent lower than in the same period last year. Lower imports were likely influenced by further weakening of the yen (fig. 5). The January-March yen depreciation averaged more than 16 percent. Further, Japanese Government data for January and February show that pork production increased almost 1 percent relative to a year earlier. It is also possible that expanded access for U.S. beef beginning in February could displace some imported pork.

The yen-U.S. dollar exchange rate will in all likelihood continue to create a very challenging market environment for U.S. pork in Japan, particularly given recent policy changes in Japan. In early April, the Bank of Japan announced a new monetary policy, the goal of which is to double the size of Japan's monetary base within a 2-year period<sup>2</sup>. One result of such a policy will likely be a significant increase in the quantity of yen in circulation. Larger quantities of yen are likely to depreciate the currency further, thus auguring continued challenges for goods imported into Japan.



Source: Global Trade Atlas.

**Figure 5. Yen-U.S. dollar exchange rate, Jan.-Apr. 2013**



Source: Board of Governors of the Federal Reserve System; <http://www.federalreserve.gov/releases/h10/current/>.

<sup>1</sup>The graphical analysis broadly assumes that U.S. pork exported to Japan is priced and delivered in the same month. Such an assumption could be violated due to timing of the purchase and/or to shipping and/or customs delays. Moreover, pricing arrangements between U.S. sellers and Japanese buyers are proprietary and may not be clearly reflected in available data. The extent to which such arrangements involve pricing and delivery in different months may compromise graphical analysis.

<sup>2</sup> The Wall Street Journal. “Money Spigot Opens Wider”, April 5, 2013