BBVA

WORKING **Papers**

The Political Economy of Exchange Rates:
The Case of the Japanese Yen

The Political Economy of Exchange Rates:
The Case of the Japanese Yen

Nathalie Aminian, K.C.Fung, Alicia Garcia-Herrero, and Chelsea C. Lin[1]

November 13, 2006
Revised: July 13, 2007

Abstract

This paper sets out a political economy model of strategic exchange rates, focusing in the importance of external lobbying. Applying it for the recent history of the Japanese yen, we show that pressure from the U.S. trade negotiators contributed to an appreciation of the Japanese yen, as well as to a reduction in import prices and profits of Japanese commercial banks.

Key words: Japan, yen, political economy model, lobbying

JEL classification: F31, F59

Contents

Introduction

With the recent interests in the Chinese yuan as a possible form of exchange rate mercantilism, many researchers and policymakers are increasingly interested in the potential role of the exchange rates in trade disputes. The central role of the Chinese yuan in international disputes is a relatively new phenomenon, a phenomenon that is clearly tied to the perceived dramatic rise of China. However, arguments about the appropriate value of the exchange rates in Asia actually date back all the way to the perceived rise of another economic giant in the 1980s and the early 1990s, namely, *Japan*.

The clearest exposition of the role of the Japanese yen in U.S.-Japan trade conflicts were given by McKinnon (2001) and McKinnon and Ohno (1997, 2001) although no model was developed to support it. Since the 1970s until recently, Japan was under constant pressure to provide market access to the U.S. exporters as well as to restrain its exports to the United States given the large bilateral trade deficit that the US was accumulating.[2] Political economy considerations led US policymakers and trade negotiators to pressure Japan to open up its markets and to reduce its exports to the United States.   At the same time, Japanese policymakers (including the Bank of Japan) acted to raise the dollar value of the yen, which should help reduce Japanese exports and increase U.S. and other foreign imports. In other words, the U.S. - Japan trade conflicts came hand in hand with a secular appreciation of the yen, followed by a decade of low growth and deflation.

In McKinnon's spirit, this paper provides an external lobby *political economy* model that illustrates how pressures from a trading partner can lead to a rise of the exchange rates. Along the line of the arguments provided by McKinnon, we further illustrate that the two appreciated yen –due to external lobbying - may have depressed the price level and hurt the profits of the Japanese commercial banks.

Our *contribution* to the literature is to provide a theoretical support for the importance of external lobbying in determining exchange rates. This follows the theoretical literature on the importance of lobbying in trade disputes based on the Grossman-Helpman model (1994). In the next section, we develop a basic political economy model of the Yen-US dollar exchange rate.

---

[2] For issues related to the United States-China bilateral trade balances, see Fung, Lau and Xiong (2006)

A Basic Political Economy Model of the Yen/US dollar exchange rate

We consider an open economy (Japan) with two sectors: one formal sector and one informal sector. The formal sector consists of two firms: the export-competing Japanese firm produces good χ for the U.S. market and the import-competing firm produces good y for the Japanese market. The informal sector produces the numeraire good n with a mobile factor only. The technology for the numeraire good has constant returns to scale. The goods, χ and y are produced with the mobile factor and a specific factor. The mobile factor is supplied inelastically to the Japanese economy. As long as the informal sector is active, the constant marginal product of the mobile factor fixes its economy-wide return to unity.

Total population in the economy is normalized to one. A fraction α^χ of the population owns the specific factor used in the production of good χ and has a direct stake in the export-competing firm, a fraction α^y of the population owns the specific factor used in the production of good y and has a direct stake in the import-competing firm. The remaining 1- α^χ- α^y (hence after, α^m) individuals are the owners of the mobile factor, which are used in both formal and informal sectors, and earn a fixed return normalized to one.

The owners of the mobile factor are assumed to be inactive politically. Each individual is allowed to own at most one specific factor. Owners of the specific factor organize as interest groups for political activity.

The behaviour of firms in the formal sector is simple Nash quantity duopoly (similar to those in Brander-Spencer, 1985). This part of the model is familiar to the strategic trade policy literature, but it is useful for our expositions later in the paper. The exporting firm produces good χ, and competes with the foreign, U.S. firm, which produces χ^* in the U.S. market.

The exporting Japanese firm charges p^χ in U.S. dollars but it cares about profits in yen. e is the yen/\$ exchange rate. The Japanese firm maximizes profit π^χ and the U.S. maximizes profit $\pi^{\chi\star}$:

$$\pi^x(x,x^*;e)=xep^x(x+x^*)-c(x) \tag{1}$$

$$\pi^{x^*}(x,\ x^*\ )=\ x^*p^x(x+\ x^*\ )-\ c^*(x^*)$$

where c and c*are the costs of the exporting Japanese firm and the foreign U.S. firm, each producing χ and χ^*, respectively.

After some algebra, we can show that a higher e (a yen depreciation) will raise π^χ. That is, a yen depreciation will raise Japanese exporting firm's profits.

The import-competing firm in Japan produces good y and competes with the U.S. exporting firm. The import-competing Japanese firm maximizes profit π^y and the U.S. firm maximizes profit π^{y^*} :

$$\pi^y(y,y^*)=yp^y(y+y^*)-c^y(y) \tag{2}$$

$$\pi^{y^*}(y,y^*;e)=\frac{1}{e}p^y(y+y^*;e)y^*-c^{y^*}(y^*)$$

where c_y and c_y* are the costs of the Japanese firm and the U.S. firms producing y and y*. c_y is in yen while c_y* is in U.S. dollars, p^y is the yen price of y while $(1/e)$ p_y is the dollar price of the U.S. export good to Japan. Some algebra will show that $d\pi_y/de > 0$, i.e. a yen depreciation will

raise the Japanese import-competing firm's profits. In sum, a yen depreciation will act like an export subsidy plus an import tax to raise Japan's yen profits for its exporting and import-competing firms. Conversely, a yen appreciation will be equivalent to an export tax plus an import subsidy lowering the yen profits of both the Japanese exporter and the Japanese import-competing firm.[3]

Lemma 1. With our oligopolistic tradable structure, a yen depreciation is a form of Japanese rent-shifitng strategic trade policies.

Turning now to the demand side, all individuals in Japan have the same preferences and maximize the utility function:

$$U^i(n, Y^c) = n^i + u(Y^{ci}) \qquad (3)$$

where $i = x, y$ and m represents the shareholders of the export-competing firm, the import-competing firm, and the owners of the mobile factor, respectively; n^i is the consumption of the numeraire good; $Y^{ci} = y^{ci} + y^{*ci}$ is the total consumption of the homogeneous goods y and y^* by individual i. The function $U(.)$ is differentiable, increasing and strictly concave in all arguments. Utility is maximized subject to the budget constraint:

$$I^i \geq n^i + p^y Y^{ci} \qquad (4)$$

where I^i is the net income of individual i; p^y is the domestic yen price of good y.

From Equation (3) and Equation (4), the indirect utility function of each individual in group i has the form:

$$V^i = I^i + u(Y^{ci}) - p^y Y^{ci}$$

$$= I^i + CS(p^y)$$

where $i = x, y$ and m; CS is consumer surplus derived from consumption of the good in the import sector. We assume that the exportable good x is not consumed domestically.

The gross indirect utility functions for each individual in each group are

$$V^x = \frac{\pi^x}{\alpha^x} + CS, \; V^y = \frac{\pi^y}{\alpha^y} + CS, \; V^m = \frac{\pi^m}{\alpha^m} + CS,$$

---

[3] The relationship between exchange rate changes and various trade barriers is examined in McKinnon and Fung (1993).

where π^x and π^y are described in Equation (1) and Equation (2); and π^m is the total fixed return to the mobile factor. Taking the yen-dollar exchange rate as given, the indirect utility function identifies the utility level of an individual in group i when there is no lobbying.

Given the yen-dollar exchange rate, the winners and losers from an intervention in the foreign exchange market can be identified, which points to the possibility of lobbying by various groups both in Japan and abroad. If no lobbying takes place, we assume that the Japanese policymakers can choose an appropriate level of the exchange rate to maximize social welfare. The government's objective function is given by:

$$Max_e \; W = a^x V^x + a^y V^y + a^m V^m$$

where W is the social welfare level which can be attained in the absence of any political contributions to the government. The socially optimal exchange rate is, then, given by e^w = arg max W. A more complicated theory of exchange rate determination can be obtained by setting one portion of the exchange rate to be determined by the market, while a fraction of the spot rate is determined by policymakers. For simplicity, we will assume that the yen is determined entirely by policymakers. While this might seem a strong assumption for a country with a floating regime, the truth is that Japan intervened massively in the foreign exchange market during the period of analysis. In addition, the model does not need to explain the level of the exchange rate but only the change, which was very much under the focus of the Japanese authorities at the time.

The lobbying structure follows Grossman-Helpman (1994). They apply Bernheim and Whinston's (1986) study on menu-auctions and common agency. The two different lobbying groups, that in favour of the yen appreciation and that against – act as bidders and offer various contribution schedules corresponding to different exchange rates to the Japanese government. Then, the government, as the auctioneer, sets the exchange rate by evaluating the weighted sum of contributions and aggregate social welfare. The equilibrium is a set of contribution schedules with the politically-determined exchange rate.

The equilibrium contribution schedules imply that the interest groups make contributions up to the point where the marginal benefit from the resulting change in the yen exchange rate exactly equals the marginal contribution costs. In equilibrium, the contribution schedules of each interest group are given by:

$$\alpha^i V_e^i = \lambda_e^i(e) \qquad\qquad (5)$$

where $i = x, y$; $\lambda^i(e)$ is the contribution schedule provided by interest group i and they are differentiable at e.

The government's objective is to maximize the possibility of being re-elected. Thanks to the lobbying groups, the government has another resource to enhance its possibility of being re-elected, i.e. the contributions provided by the interest groups. The existence of lobbying groups also influences the government's objective function since it contains not only the aggregate social welfare but also the total level of political contributions. The government's objective function can now be written as

$$Max_e \; V^G = (\beta\text{-}1)[\lambda^x(e) + \lambda^y(e)] + W \qquad\qquad (6)$$

where $\beta > 1$ represents the weight that the government puts on the contributions provided by the interest groups.[4]

The first order condition of the government's optimization problem is:

$$V_e^G = \beta(\alpha^x V_e^x + \alpha^y V_e^y) + \alpha^m V_e^m = 0 \tag{7}$$

The politically determined yen-dollar exchange rate is given as e^p = arg max V^G. This is the basic framework for a politically determined yen-dollar rate.

We now introduce the element of the foreign pressure. The source is political lobbying due to the U.S. trade negotiator. We assume that the Japanese policymakers will take into account the U.S. interest in the objective function of the government. An index of the U.S. interest is a function of decreasing Japan's trade surplus TB with the U.S. Thus we have

$$V^G = (\beta - 1)(\lambda^x(e) + \lambda^y(e)) + \theta f(TB) + W \tag{8}$$

where $0 < \theta < 1$ is the weight attached by the Japanese policymakers on the U.S. special interest, i.e., the reduction of Japan's trade surplus with the U.S. The first order condition for this expanded objective function of the government is:

$$V_e^G = (\beta - 1)(\lambda_e^x + \lambda_e^y) + We + \theta f'(TB)TB_e = 0 \tag{9}$$

where $f' < 0$ and subscripts are partial derivatives. Assuming that the Marshall-Lerner condition holds, $\partial TB/\partial e > 0$, i.e. a yen appreciation will reduce Japan's trade surplus with the United States. Totally differentiating equation (9) and using the implicit function theorem, we can determine what is the impact of the political pressure of the U.S. trade negotiator on the yen-dollar exchange rate.

$$V_{e\theta}^G d\theta + V_{ee}^G d\theta = 0 \tag{10}$$

$$de / d\theta = -V_{e\theta}^G / V_{ee}^G$$

In particular (10) holds for an initial value of $\theta = 0$ so that

$$de^p/d\theta|_{\theta=0} = -f'(TBe)/ V_{ee}^G < 0 \tag{11}$$

since $f' < 0$ by construction, $TBe > 0$ and $V_{ee}^G < 0$ are the sufficient second order conditions.

Eq. (11) shows that the more US lobbies focus on Japan, i.e., the higher θ, the more the yen will appreciate against the dollar.[5]

Proposition 1: Using our political economy model of the exchange rates, Japanese yen appreciates with political pressure from U.S. trade negotiators.

Since we are interested in the impact of external lobbying on the trade account and the Japanese economy in general, we need to determine how prices will react. This should give us an idea of the changes in the real exchange rate as a consequence of external lobbying and, thereby, in competitiveness. McKinnon (2001) had argued that the political economy of the yen had put downward pressure on the price level in Japan as well as on the balance sheets of the Japanese banks. While our model is too narrow to fully examine all these issues, it can still provide some simple results along this line of argument.[6] From the profit function of the U.S. exporter and the Japanese import-competing firms, we can obtain:

$$dy/de + dy^*/de = -\pi_{y*e}^{y*}(\pi_{yy*}^{y*} + \pi_{yy}^{y})/\Delta^y < 0$$

where $\pi_{yy*}^{y} = p^{y'} + yp^{y''}, \quad \pi_{yy}^{y} = 2p^{y'} + yp^{y''}, \quad \pi_{y*e}^{y*} = -(p^y + y^* p^{y'})/e^2$, and

$\Delta^y = \pi_{yy}^{y} \pi_{y*y*}^{y*} - \pi_{yy*}^{y} \pi_{y*y}^{y*}$. The impact of the U.S. influence on the yen and the import price is

$$dp^y/d\theta = \left(\frac{de^\rho}{d\theta}\right)\left(\frac{d(y+y^*)}{de^\rho}\right)\left(\frac{dp^y}{d(y+y^*)}\right) < 0 \qquad (12)$$

In particular (12) holds for an initial value of $\theta = 0$. U.S. pressure will lead to a yen appreciation by Proposition (1). An appreciation will raise the total output of the importable sector in Japan, which leads to a lowering of the price level.

Suppose now we introduce a banking industry with a representative main bank maximizing B:

$$B = (i - \hat{i})v(i,k) + s^x \pi^x + s^y \pi^y \qquad (13)$$

where i is the loan rate, the deposit rate is $\hat{i}$ so that $(i-\hat{i})$ is the interest rate spread. v is the volume of loans, k, the demand for physical capital, which depends on outputs x and y, $s^i\{i=x, y)$ is the proportion of shares held by the bank over the Japanese export firm and the import-

competing firm. We can directly incorporate the banks as an additional lobbyist, but the result with respect to the politically-determined exchange rate is the same

$$V^G = (\beta\text{-}1)(\lambda^x + \lambda^m + \lambda^B) + W + \theta f(TB)$$

where λ^B is the campaign contribution schedule by the private main bank. Using the same analysis as before we get

$$de^\rho / d\theta\,|_{\theta=0} = -(f'TB_e)/V^G_{ee} < 0$$

With or without lobbying by the Japanese banks, U.S. trade negotiators can put pressure on Japan to appreciate the yen. Suppose we leave the issue of whether bank act as lobbyist by themselves and study the impact of the yen exchange rate change on bank profits, we have

$$dB/d\theta = \frac{de^\rho}{d\theta}\frac{dB}{de^\rho}$$

$$= \left[(i - \hat{i})\frac{\partial v}{\partial k}\frac{\partial k}{\partial e^\rho} + s^x\frac{d\pi^x}{de^\rho} + s^y\frac{d\pi^y}{de^\rho} + v(\frac{di}{de^\rho}) \right]\frac{de^\rho}{d\theta} \qquad (14)$$

To evaluate the sign of (14), we can consider the terms separately. Due to institutional reasons, the Japanese deposit rate has always been very low. [7] To combat slow growth in Japan, the Bank of Japan had been lowering their inter-bank rates to stimulate investment. This put downward pressure on the commercial banks' loan rates i, reducing the interest rate spread. A higher value of the yen reduced Japanese exports and the import-competing good, with a lower demand for physical capital, i.e. $dk/de^\rho > 0$. In the previous section, we demonstrated that profits of Japanese firms decline with a yen appreciation, i.e. $d\pi^x/ de^\rho > 0$ and $d\pi^y/ de^\rho > 0$. Thus, all the terms of (14) point to the same direction, with $dB/de^\rho > 0$ and from Proposition 1 we have $de^\rho/d\theta < 0$ so that $dB/d\theta < 0$

Proposition 2   Using our political economy model of the exchange rates, pressure from the U.S. trade negotiators leads to an appreciation of the Japanese yen, a decline of the import price level and a drop in bank profits Japanese commercial banks.

Finally, we take into account the special nature of Japanese firms, in the spirit of Aoki's model. We model Japanese firms as a coalition of shareholders and incumbent workers. The Japanese manager acts as a Nashian arbitrator and maximizes a weighted sum of the shareholders interest

---

[7] This may be due to the historically large saving rates and the regulations against new entrants in the banking sector in Japan.

{S_i, i =x, y) and workers interests *{L_i, i =x, y)* within the firm. In effect, let the objective function of the Japanese export firm be Fx and that of the import- competing firm be F^y, the Japanese managers maximize

$$F^x = S_x^{\gamma} L_x^{1-\gamma}$$

$$F^y = S_y^{\sigma} L_y^{1-\sigma}$$

where γ and σ are the weights attached to the shareholders interests in the export and the import- competing sector, respectively. In the menu auction approach, shareholder and worker of each firm will act as separate lobbyist:

$$V^{G2} = (\beta - 1)(\lambda_{Kx}^x + \lambda_{Lx}^x + \lambda_{Ky}^y + \lambda_{Ly}^y) + W^2 + \theta f(TB)$$

$$V_e^{G2} = (\beta - 1)(\lambda_{Kxe}^x + \lambda_{Lxe}^x + \lambda_{Kye}^y + \lambda_{Lye}^y) + W_e^2 + \theta f'(TBe) = 0$$

The aggregate social welfare now is given by

$$W^2 = \alpha^{Kx} V_{Kx} + a^{Lx} V_{Lx} + a^{Ky} V_{Ky} + a^{Ly} V_{Ly} + a^m V_m$$

where α^{Ki} is the population of the shareholders in the export sector and import-competing sector and a^{Li} is the population of the incumbent workers in sector i. Whatever the definition of W^2 and V^{G2}, the impact of the pressure from the U.S. - Japan trade conflict remains as

$$de^{\rho} / d\theta = -[f'(TBe)]/V_{ee}^{G2} < 0$$

where *f'<0, TB_e>0* and V_{ee}^{G2} *<0* so that *de$^\rho$/dθ<0*, i.e. increasing U.S. pressure will lead to an appreciation of the Japanese yen.

Proposition 3   Even with Aoki's type J-firm, our political economy model shows that pressure from the U.S. trade negotiator will lead to an appreciation of the Japanese yen.

Endogenizing the impact to of U.S. Lobbying on the Yen

During the late 1990s and from 2000 onwards, it seems that the U.S. has eased its pressure on the Japanese government to appreciate the yen, even though in recent months, as Toyota is poised to become the largest automaker in the world, some voices from the U.S. Congress have started to come out with respect to an undervalued yen. However, in general, how does one explain this relative lack of external pressure on the yen to appreciate? We can accommodate this phenomenon by allowing the weight attached to the U.S. interest to be a function of Japan's economic size. Two aspects of the late 90's up to the present seem to have changed this weight. First, we have the long period of boom years for the U.S. in the late 1990s. Prosperity in the U.S. has lessened the pressure on U.S. trade negotiators to negotiate the opening of Japan's markets and reducing Japanese exports. U.S. corporations have been doing exceptionally well recently and the importance of competition from Japan has been reduced. Second, Japan's decade-long slow growth also means that the competitive threat from Japan has declined substantially. The U.S. government also seems to be more willing to lessen pressure on Japan so that Japanese policymakers can focus on their internal reforms.

To take into account such changes, we make θ be a function of the two countries relative incomes $Y = Y^{US}/Y^{J}$. Since Y^{US} has risen relative to Y^{J} since the mid-90s, θ becomes smaller. In other words,

$$V^{G3} = (\beta - 1)(\lambda^x + \lambda^y) + W + \theta(Y) f(TB)$$

$$\frac{de^{\rho}}{dY} = \left(\frac{de^{\rho}}{d\theta}\right)(\theta') > 0$$

Proposition 4   Using our political economy model of exchange rates, if we permit the weight attached to the U.S. lobbying to be a function of the Japanese economic power relative to that of the US, our model is compatible with the easing of pressure for the yen to appreciate.

Conclusion

This paper provides a theoretical political economy model of strategic exchange rates. To this end, we follow the Grossman-Helpman lobbying approach and apply it to a novel setting, namely exchange rate policy.

We apply it to the recent history of the Japanese yen. We formalize McKinnon's hypothesis and show theoretically that pressure from the U.S. trade negotiators contributed to an appreciation of the Japanese yen. The politically-determined appreciation also led to a reduction in Japanese import prices as well as profits from Japanese commercial banks. We further modify our political economy model to take into account the special nature of Japanese firms, namely that of a cooperation of Japanese shareholders and workers. Finally, we extend our analysis to show that as Japan's growth slowed during the 1990s and beyond, the external political pressure for further yen appreciation also diminished.

Given the recent heightened political interests on how Asian governments may have manipulated their exchange rates to maintain their export competitiveness, we believe that our political economy model of exchange rates can make a contribution to both the academic and policy debates on the linkages among politics, exchange rate policy and trade disputes.

More specifically, the Chinese seems particularly well placed for an application of this theoretical framework since trade conflicts between China and the US are permanently in the headlines and the Renminbi exchange rate is clearly much more controlled than was the case with the yen during the period analyzed in this article.[8] However, we need to conduct further research to determine whether and to what extent is the Renminbi undervalued.

---

[8] For some recent discussions of related issues with China, see Garcia-Herrero and Tuuli (2006) and Fung, Lau and Xiong (2006).

References

Aminian, N., 2005, "Economic Integration and Prospects for regional Monetary Cooperation in East Asia," Structural Change and Economic Dynamics, v.13, number 1, pp. 91-110

Aoki, M., 1988, The Cooperative Game Theory of the Firm, Oxford

University Press.

Bernheim, B. Douglas and Whinston, Michael D., "Menu Auctions,

Resource Allocation, and Economic Influence," Quarterly Journal of

Economics, February 1986, 101(1), ppl-31.

Brander, J. and B. Spencer, 1985, "Export Subsidies and International

Market Share Rivalry," Journal of International Economics, 18, 83-100.

Fung, K.C., Lawrence J. Lau and Yanyan Xiong, 2006, "Adjusted Estimates of United States-China Bilateral Trade Balances: An Update," Pacific Economic Review, v.11, issue 3, pp. 299-314.

Garcia-Herrero, A. and Tuuli Koivu, 2007, "Can the Chinese Trade Surplus be Reduced with the Exchange Rate Policy?" BOFIT Discussion Paper, 07-06, Bank of Finland.

Grossman, G. and E. Helpman, 1994, "Protection for Sale," American

 Economic Review, Vol. 84 (4), 833-850.

McKinnon, Ronald I., 2001, "Japan's Banking Crisis and Low-Interest Rate Trap," mimeo, Stanford University, May.

McKinnon, Ronald I., 2001, "Japan's Banking Crisis and Low-Interest Rate

Trap," mimeo, Stanford University, May.

McKinnon, Ronald I. And Kenichi Ohno, 2001, "The Foreign Exchange Origins of Japan's Economic Slump and Low Interest Liquidity

Trap,"The World Economy, March

McKinnon, Ronald I. And Kenichi Ohno, 1997, Dollar and Yen: Resolving

Economic Conflict between the United States and Japan, Cambridge:

MIT Press.

McKinnon, Ronald I and K.C. Fung, 1993, "Floating Exchange Rates and

the New Interbloc Protectionism: Tariffs versus Quotas," ed. Dominick

Salvatore, Protectionism and World Welfare, New York: Cambridge

University Press.

WORKING PAPERS

BBVA