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Abstract	Although the human capital approach became popular in the 1970s, eventually the institutional and structural approach dominated the analysis of wages in Japan. Statistical measurement (econometric) problems are numerous in human capital theory: censoring bias, omitted variables, endogeneity, job match heterogeneity, and the like. Internal labor markets, dualism, and segmentation explains various facets of Japanese wage determination in varying degrees of success. Some wage analysts used an "ad hoc", combination of human capital theory in combination with the institutional framework to explain the specific characteristics of the Japanese wage system. The main weakness of the institutionalist approach is the limited ability of the descriptive (empirical) methods to explain the evolution and direction of wages with respect to social and industrial relations. During periods of rapid economic growth in Japan, wage increases had been well explained by the demand-supply conditions in labor markets. The job offer-application ratio acted as a proxy for excess labor demand, and indirectly for the level of aggregate production. This equation however lost its explanatory ability after the first oil crisis. Since then, consumer prices, enterprise profits and terms of trade (input and output prices) had high explanatory power until the second oil crisis. In the 1980s, analysts observed a certain degree of wage flexibility in Japan. The ability of conventional quantitative approaches to identify the factors which explain this flexibility has decreased, pointing to the possibility of qualitative variables such as "consensus" and "accommodation" having a greater role in Japanese wage determination. This would obviate the role of an apparent decline in trade union strength as a factor behind such flexibility. Structural and qualitative changes in the Japanese labor force, and the increasing use of managerial strategies and techniques are seen to be the relevant factors in contemporary wage determination in Japan.
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# HUMAN CAPITAL, THE INSTITUTIONAL AND STRUCTURAL APPROACH TO WAGE DETERMINATION IN JAPAN: A REVIEW OF LITERATURE

by

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## *ABSTRACT*

Although the human capital approach became popular in the 1970s, eventually the institutional and structural approach dominated the analysis of wages in Japan. Statistical measurement (econometric) problems are numerous in human capital theory: censoring bias, omitted variables, endogeneity, job match heterogeneity, and the like.

Internal labor markets, dualism, and segmentation explains various facets of Japanese wage determination in varying degrees of success. Some wage analysts used an "ad hoc", combination of human capital theory in combination with the institutional framework to explain the specific characteristics of the Japanese wage system. The main weakness of the institutionalist approach is the limited ability of the descriptive (empirical) methods to explain the evolution and direction of wages with respect to social and industrial relations.

During periods of rapid economic growth in Japan, wage increases had been well explained by the demand-supply conditions in labor markets. The job offer-application ratio acted as a proxy for excess labor demand, and indirectly for the level of aggregate production. This equation however lost its explanatory ability after the first oil crisis. Since then, consumer prices, enterprise profits and terms of trade (input and output prices) had high explanatory power until the second oil crisis.

In the 1980s, analysts observed a certain degree of wage flexibility in Japan. The ability of conventional quantitative approaches to identify the factors which explain this flexibility has decreased, pointing to the possibility of qualitative variables such as "consensus" and "accommodation" having a greater role in Japanese wage determination. This would obviate the role of an apparent decline in trade union strength as a factor behind such flexibility. Structural and qualitative changes in the Japanese labor force, and the increasing use of managerial strategies and techniques are seen to be the relevant factors in contemporary wage determination in Japan.

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## *I. Preliminary Remarks*

The wage experience in Japan is particularly relevant not only with respect to advanced Western economies, but also for developing countries which experience among others, severe income distribution and employment problems.

The historical development and subsequent trends in the movement of the wage level in Japan has provided important implications to the universality of recognized principles in industrial relations particularly labor market dynamics. This is especially true with respect to the relationship between wages and economic growth. An important question in this regard is how the wage structure in Japan evolved into its present status, and how analysts view such process. This essay aims to clarify the following questions:

1. What are the current approaches and methodologies used by analysts in identifying the factors which influence the determination of wage levels in Japan?
2. How do analysts approach the relationships between these factors?

## *II. Review of Literature<sup>1)</sup>*

Wage analysis in Japan is quite abundant. Authors use a variety of analytical approaches which at first glance may defy classification. To arrive at strictly defined categories is however not the object of this paper. Rather, the description of the analytical trends would be useful to distinguish which results are appropriate for certain objectives, especially if such results have clear policy implications.

A convenient approach to classify and review literature on wage analysis would therefore be from the vantage point of the professional interest and objectives of the author. Most of the wage analysis is done using frameworks and methods universally available in economics as a social science discipline. Thus, the bulk of the discussion uses language used in standard economic and social analysis.

Mainly on the basis of convenience, and as a result of the writer's preliminary investigations, this review uses the following schema to categorize the "streams" of thought on Japanese wage analysis. As a whole, it could be said that commentators on Japanese wages concern themselves with the following approaches:

1. The general competitive labor market framework
  - a. Human capital approach
  - b. Macroeconomic labor market and general equilibrium models
2. The institutional and structuralist approach
  - a. Dual labor markets

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1) This review is limited to contemporary books and articles which analyze the wage levels in Japan which were available to the writer in the summer of 1990. The review is not comprehensive. Most items in the bibliography were written in Japanese. Some articles have English translations. A number were written by American authors. It is highly purposive and arbitrary in that it emphasizes the readily accessible approaches in the literature.

- b. Internal labor markets
- c. Labor market segmentation
- 3. Other approaches
  - a. Culturalist approach
  - b. Managerial approach
  - c. Corporatist approach

These "streams" of analyses are not mutually exclusive of each other, nor do they define polar cases. The review reveals that a majority of the writers managed to define a framework which combines both competitive and institutional elements to explain labor market phenomena in Japan. This is especially true in wage analysis which uses the framework of labor market segmentation.

Wage analysis is primarily a part of labor market economics. Thus it is not surprising that the orthodox approach, which uses competitive assumptions would be applied in the interactions between wages and other labor market variables. The neoclassical framework of competitive labor markets is a rite of passage that most economic analysts go through in their period of academic formation. For this reason, the logic of competitive, equilibrium seeking markets also permeate Japanese wage analysis.

Despite the language barrier, the literature reveals that Japanese analysts are up to date with the developments in econometric techniques in wage analysis in the West. It is regrettable that much of the rich material on wage analysis written in Japanese are not accessible to non-Japanese scholars.

#### A. Human Capital Theory in Japan

Numerous studies involving human capital theory in Japan appeared in the 1970s. Among Japanese analysts it has become one of the most often used starting point for creating an analytical method. Some studies link human capital with the wage efficiency approach. Both approaches emphasize the factors behind the wage level of the individual worker.<sup>2)</sup>

Under human capital theory, the worker is the unit of analysis. The worker is conceptualized as a small and independent "firm" with a certain capital stock. The product of human capital is a certain type of labor service. When put to productive use, such human capital adds a certain marginal productivity which commands a certain price, which is the "wage". In the conception of Mincer and Becker, each "human capitalist" maximizes utility or profit by adjusting the quantities of production inputs to be purchased and production outputs to be sold in the competitive market at the going price.

Critics of the human capital approach point to its weakness: that firms actually do

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2) The best known classical works on human capital in the U.S. are those by Gary S. Becker, *Human Capital: Theoretical and Empirical Analysis with Special Reference to Education*, (New York: National Bureau of Economic Research, 1964); and by Jacob Mincer, *Schooling, Experience and Earnings*, New York: Columbia Press, 1974). Whereas human capital approach dominated the analysis in the 1960s upwards, the interest in wage efficiency is quite recent (Eda and Okazaki, 1989).

not exchange labor services for wages.<sup>3)</sup> Most work contracts specify labor time as a basis for payment. It is labor power, or capacity to work which is involved in the transaction, not the individual "human capital" per se. Also, while competitive demand and supply for human capital may characterize the labor market, such market forces exist due to certain prevailing social and economic relations. Lastly, the role of technical relations is not clear in the framework; this could not be simply assumed as given.

In Japan, the human capital model has been applied by Kuratani (1973); Shimada (1974); Stoikov, 1973; Hashimoto (1979); Hashimoto and Raisian, 1985; Ono (1987) Mincer and Higuchi (1988); Ohkusa, Ariga, et. al. (1990) and some other authors for various purposes, and with varied (if not polar) results. They used different specifications of the wage variable, as well as different forms of explanatory factors. Except for Ono, all the others found a large effect of job tenure on wages.

One primary reason for the wide use of the human capital approach (with or without competitive market assumptions) appear to be for comparative purposes with the United States and Western European wage levels (such as that of Shimada, 1974 and 1981; Hashimoto and Raisian, 1985). Western analysts oftentimes use human capital variables to compute comparative market wage levels. To have comparative results, Japanese analysts use similar frameworks for computational purposes.

One set of result emphasizes and affirms the special characteristics of the Japanese wage structure over their Western or American counterparts (such as Hashimoto and Raisian, 1985). Hashimoto and Raisian confirmed that long term employment is more prevalent in Japan than in the United States. Also, the earnings and tenure profiles are more steeply sloped in Japan than in the United States. Hashimoto (1979) devised a "specific human capital" model which accounts for investment by the firm for on the job training. He found that specific human capital in Japan is greater than that in the United States.

In contrast, another set of results concludes that the Japanese wage system shares common characteristics with that of their Western counterparts (Koike, 1983) as well as other Asian countries such as South Korea (Ono, 1987), primarily with respect to the role of age and work experience in relation to wages. Mincer and Higuchi (1988) concludes that as much as two-thirds of the turnover in age groups in the two countries is explained by wage profiles.

Ono argued against the interpretation by Hashimoto-Raisian (1985) of the wage tenure profile. Ono (1989) explained the steepness of the wage-tenure profile in Japan as due to the age-consumption pattern. He concluded that the age variable is more important than job tenure in wage differentiation in Japan. This would put into question whether there is indeed a significant return to seniority or job tenure. This result may seem to agree with an earlier pattern found by Stoikov (1973). If the *nenko* system is the

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3) A critique of the human capital approach could be found in Samuel Bowles and Herbert Gintis, "The Problem with Human Capital Theory: A Critique" in *American Economic Review*, May 1975.

norm in Japan, then one could expect previous or external experience to have a small effect upon earnings. Stoikov concluded that there is no evidence that larger firms pay higher wages than smaller ones for the same quality of labor input.

Yasuba (1976) however criticized Stoikov for not taking into account bonuses which significantly affect total earnings. He also omitted workers with 30 or more years of experience in his computations, and equated length of service as equivalent to on the job training when there is no correlation between the two in large firms.

Kuratani (1973) used human capital theory to demonstrate, using microeconomic techniques, that lifetime commitment and the length of service reward system are the results of optimal choices of employers and workers. Also using the microeconomic technique, Hashimoto (1979) finds a close association between the bonus-pay system and the Japanese internal labor market.

The conclusions by Ono are particularly interesting. While sharing computational techniques used in the human capital tradition, Ono (1987) uses a distinct set of specifications for the variables to evolve a "living expenditures guarantee hypothesis" to explain wage variations in Japan. This could be considered an alternative approach to human capital theory.<sup>4)</sup> Ono confirms that in large and medium firms, work experience in terms of internal work experience, as well as similar experience on the same job in other companies explain wage variation more significantly than the age variable.

These issues, along with significant econometric estimation problems led Tachibanaki (1990) to conclude that human capital theory is not a well-established doctrine which is universally accepted in Japan. The problem involves proper econometric techniques. These may include the treatment of individual and job match heterogeneity, censoring bias, and omitted variables.

"Censoring bias"<sup>5)</sup> involves the nature of the dependent variable: observed wage levels are not wage offers made by firms, but wages accepted by workers, and thus causes overestimation of return to tenure in the wage equation. Omitted variables may involve quality of the worker, job-or-worker-employer match which maybe correlated with tenure.

## B. The Institutional and Structural Approach

The institutional and structural approach emphasizes the components and processes involved in wage determination. The focus is upon empirical patterns, as given by statistical data for instance. In the analytical process, a priori assumptions such as "competitive conditions" do not constitute a constraint. This approach instead puts primary importance on the specific "institutions" as they are found in Japanese industrial relations. For instance, an important overlying hypothesis is that instead of competitive condi-

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4) The hypothesis has much in common with the "life cycle" theory propounded by Modigliani, but here it is specifically applied to the analysis of wages. Robert J. Gordon labels this hypothesis as properly within the Marxian mode of argumentation (Tachibanaki and Taki, 1990).

5) See R. C. Marshall and G. A. Zarkin, "The Effect of Job Tenure on Wage Offers", *Journal of Labor Economics*, Vol. 5 (1987), pp. 301-324.

tions, institutions such as the *nenko* system, lifetime employment, enterprise unionism, and the like circumscribe the wage parameter. The “structural” approach on the other hand emphasize basic categorical and empirical relations, with their hierarchies. Although complex, this approach emphasizes the interactive nature of the identified structural relations. The structural approach is more analytical than the descriptive methods of institutionalism.

The institutionalist approach is a significant deviation from the neoclassical labor market model of wage determination which relies solely upon the free forces of supply and demand.<sup>6)</sup> The emphasis is upon institutions such as trade unions, the government, and employers. Customs and rules in the workplace determine the allocation of jobs, and the level of wages. While it is strong upon explaining actual *results*, one weakness of the institutionalist approach is that it is limited in its ability to explain the *process* of how the customs, rules, or wage levels/policies finally came about.

It could be said that the institutional and structural approach could fairly describe most of the works of such eminent Japanese wage analysts as Profs. Yoko Sano, Akira Ono, Koji Taira, Toshiaki Tachibanaki, Ryohei Magota, Yoshio Higuchi, Katuzoshi Koshiro and others.

Dual labor markets identify boundaries between small and large scale enterprises as a source of wage differentiation (Odaka, 1967). Odaka and Taira (1970) interpreted the rise of dualistic wage structures in neoclassical terms. The evolution of the dualistic wage structure has been discussed by Yasuba (1976). He argued that dualistic wage structures did not exist in the 1880s or the 1890s. The *nenko* wage system associated with lifetime commitment are therefore not deeply rooted in Japanese tradition. Yasuba used very careful econometric methods to focus upon the dualistic wage structure in the postwar period. Using such measures as firm size elasticity and the coefficient of variation, Yasuba concluded that wage differentials associated with firm size already existed in 1909. It accounted for 20% of wage differentials during that period, which increased to 30% by 1914. Wage differentials narrowed during the war, then widened after.

Tachibanaki (1975) however labeled as a myth the “dual structure” in terms of interscale differentials among firms. For him, the sex variable has increasingly been the most important factor in determining wage differentials. Other analysts identify different labor market segments, wherein such factors as industry type, region, and the like play important roles in “wage segmentation” (Kawashima and Tachibanaki, 1986; Chen, 1980).

Internal labor markets, on the other hand view enterprises as “islands” and only the amount of training received, which determine skills acquisition become a significant

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6) The “institutionalist” school arose out of the dissatisfaction with 19th century classical and neoclassical economic analysis with respect to public policy. Institutionalism emphasizes factual and empirical orientation in economic analysis. Institutionalists who were mostly Americans derided the approach of generating a set of assumptions by inductive observation or by introspection, from which are deduced probabilistic statements that have predictive and explanatory consequences. (See Sanford M. Jacoby, “The New Institutionalism: What can It Learn from the Old?” in *Industrial Relations*, Vol. 29, No. 2 (Spring 1990), pp. 316–359.

wage factor. In this view, enterprises are shielded from the external, competitive labor market.<sup>7)</sup>

The use of internal labor market analysis exhibits an ascending trend in the Japanese wage literature. In this review, it is treated as part of structural analysis in that it emphasizes the primary role of the internal elements in the firm in determining wage results. For instance, the *nenko* structure of compensation is explained quite well by the internal labor market framework (Sano, 1989).

This point has been amplified by the analysis of seniority wages (Koike, 1983) of workers in large Japanese firms which constitute a vital component of the internal labor market. The careful analysis of seniority wages enabled Koike to conclude that blue collar workers in large Japanese firms share important skill and work-career characteristics with white collar workers in Western Europe. Furthermore, the system under which Japanese workers gain their skills enables them to perform a wide range of jobs, and thus is the cornerstone of both internal labor markets and industrial relations in Japan. In fact, Koike argues, blue-collar workers in large firms in Japan resemble white collar workers in the U. S. and West Europe due to the high wages and fringe benefits they enjoy.

The appearance of internal labor markets in Japan is traced to the initial period of sustained industrialization (Jacoby, 1979). Jacoby contended that initially, the internal labor market was limited to skilled (white) collar workers in large firms. The *nenko* wage system then was introduced as a result of the decline of traditional forms of skilled labor organizations. Jacoby argued that it was a device to elicit worker loyalty and raise effort levels. As work organizations shifted to more oligopolitic, capital intensive and bureaucratic styles of management *nenko* wages enabled enterprises to retain skilled workers.

Labor market segmentation is essentially an analysis involving the historical process of how the various segments came about. It is defined as the "historical processes whereby political-economic forces encourage the division of the labour market into separate submarkets, or segments distinguished by different labor market characteristics and behavioral roles."

Labor market segmentation analysis<sup>8)</sup> also requires a detailed examination of how

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7) The stimulus towards internal labor market analysis was provided first by Peter B. Doeringer and Michael J. Piore, *Internal Labor Markets and Manpower Analysis* (Lexington, Mass.: D. C. Heath, 1971).

8) Internal labor markets concern long-term, contractual relationships between a firm and its employees. It is a set of explicit or implicit long term agreement on the following: wages; hours of work; promotion; grievance settlement, and the like. An update on the status of internal labor markets in the U.S. literature is given by Michael L. Wachter and Randall D. Wright, "The Economics of Internal Labor Markets", *Industrial Relations: A Journal of Economy and Society* Vol. 29, No. 2 (Spring 1990), pp. 240-262. For a Western writer's viewpoint, see Sanford M. Jacoby, "The Origins of Internal Labor Markets in Japan," *Industrial Relations*, Vol. 18, No. (Spring 1979), pp. 189-196.) A survey of the work done on labor market segmentation is found in R. Loveridge and A.L. Mok, *Theories of Labor Market Segmentation* (The Hague: Martinus Nijhoff, 1979).

the various labor market segments determine each other's locus, and thereby the overall level of wages and employment. Taira (1961; 1970) pioneered in this analytical approach. He linked the movements in Japanese wage differentials with the nature of Japanese economic development, always giving due weight to the historical forces at work. His most important finding is that in prewar Japan, wage differentials are associated in an inverse manner with business conditions in "Kuznets cycles", not the Lewisian subsistence wage pattern before industrial take-off.<sup>9)</sup> Wage differentials narrowed during prosperity, and widened during depression. Also, Japanese wage differentials over time exhibited flexibility to changes in economic conditions.

The Shunto wage negotiations is a unique hallmark of the Japanese system of wage determination. Due to the Shunto mechanism, the structural and institutional approach explained a major facet of Japanese industrial relations, if not the labor market as a whole. The analysis of the determination of the Shunto rate (extensively worked upon by Sano, 1969; 1971; 1980; 1981; and by Koshiro, 1980; 1983) provided an important impetus for the relevance and a relative measure of success of the institutionalist approach in Japan. The spillover mechanism of Shunto, for instance required a structural view of the complex interrelationships between wage pattern setters and followers, an area focused upon by Sano (1980) and by Sano, Koike and Ishida (1971). Such has been the implied approach by Koshiro when he analyzed the spillover effect of the Shunto rate as an institution in national collective bargaining into the public sector (Koshiro, 1980).

During periods of rapid economic growth in Japan, wage increases had been well explained by the demand-supply conditions in labor markets. This variable acted as a proxy for excess labor demand, and indirectly for the level of aggregate production. This equation however lost its explanatory ability after the first oil crisis. Since then, consumer prices, enterprise profits and terms of trade (input and output prices) had high explanatory power until the second oil crisis. Since 1980, actual wage increases were much lower than was predicted by conventional wage equations.

The attempt to explain these complex interrelationships led to the use of the "dual labor market" approach which emphasize the effect of firm size (large, medium, small) upon wage differentials. Of course, there are other attributes of the dual market structure, aside from wage differentials — different capital/labor ratios, productivity, profit rates, and the like between large and small/medium enterprises.

Higuchi (1989) observed an anti-cyclical relationship between wage differentials and business conditions for workers who have longer years of service. His findings on the impact of internal factors and international competition upon the wage structure is more significant. Higuchi concludes that value-added labor productivity and per capita ordi-

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9) Taira's (1970) one other important conclusion is that the concept of "unlimited supply of labor" in the process of economic development, as propounded by W. Arthur Lewis could not be applied to any stage in modern Japan. He maintained that "the flexibility of relative wages in Japan is an aspect of the general economic process which is fundamentally neoclassical". If wages are variable in the early stages of Japanese industrialization, then the "subsistence wage" of Lewisian model would not apply.

nary profit in each firm have almost the same effects on wages, regardless of job tenure. This means that there are actually small or almost negligible wage differentials due to these factors.

A typical illustration of how the structural approach is used in wage analysis is given by Nakamura (1987) and Ichino (1990). A distinct type of dualism in the labor market structure is presented. Nakamura computed inter-firm wage differentials between mid-career recruits and those hired periodically. His results confirm significant wage differentials between the two groups, other factors (size of firm, educational attainment) being equal. The wage profile of midcareer recruits are significantly lower than the regularly hired. Ichino (1990) on the other hand used the traditional price and unemployment variables in the wage equation to determine the extent of wage differentials between small (30–99 workers) and big (500 workers and above) enterprises.

Chen (1980) developed a distinct model of the segmented labor market approach, incorporating both human capital and non-human capital factors. Chen's objective was to explain wage inequality due to factors which give rise to segmentation (such as sexual discrimination). In outlining the methodology, Chen begins with the distinction between labor and labor power. The firm is the unit of analysis: its position in the economy, the events (including conflict between the firm and its workforce) and pressures from external political forces are the factors which determine the job and wage structure.

Kawashima and Tachibanaki (1986) also combined both human capital and labor segmentation factors in investigating wage differentials in Japan. Their view is that labor market segmentation is a consequence of the more fundamental process of segmentation in the whole economy. Economic segmentation is defined as a consequence of the process of concentration of market power within an industry (division between the oligopolistic and competitive sectors). Wage determination patterns in these sectors are therefore expected to be different. One of their hypothesis is that within each sector, women and men face different processes of wage determination. Differences in education, or work experience are not important sources of wage differentials in terms of sex. Their results confirmed prevailing discrimination in pay against women in Japan. They also found that human capital variables and structural variables have approximately the same explanatory power in explaining wage differentials. Of the structural variables, sex has the largest coefficient, while market power (oligopolistic/competitive) has the smallest.

### C. Macroeconomic and Nash Bargaining Equilibrium Models

In the neoclassical macroeconomic analysis, wages are often treated as an exogenous factor. Institutions such as trade unions, and government policy intervention bring about market inefficiencies, since they "block" the competitive operation of market forces. Most western labor market models usually adopt this stance.

An opposite hypothesis states that wages tend to increase when the ratio of organized workers in the labor force is high. Trade unions enter the wage determination process through collective bargaining. Focus on collective bargaining gave rise to two views about the role of unions: as monopoly market forces, and as agents of "efficient bargain-

ing". A Nash bargaining solution is the objective in these type of models.<sup>10)</sup> Yabuta (1989) used the Nash bargaining approach in developing a "right to manage" model which he used to derive an empirical wage equation. The "right to manage" model assumed that employment is determined unilaterally by the firm but the wage level is determined by the bargaining between the trade union and the firm. His conclusion is that the bargaining power of Japanese trade unions in wage determination has become stronger during the period between the first and the second oil crisis. His results are consistent with the findings of Shimada and Hayami (1985) who also used a Nash bargaining approach to conclude that trade union behavior in wage determination significantly changed before and after the first oil crisis.

#### D. Non-functional/quantitative Approaches

The non-quantitative framework to wage determination in Japan could be said to include the following: the cultural approach, the managerial (i.e. human resource management) techniques, and political economy (i.e. corporatism).

As described by Shimada (1983), the culturalist approach to Japanese wages concerns the discussion around the *nenko* wage. In general, the *nenko* wage system is a method of determining wages, salaries and other rewards from employment based primarily on a workers' length service, and partly on his age and education. With this system, a worker is assured of sufficient earnings to cover his needs over his life cycle. It is not a simple seniority rule however, since the system works to evoke loyalty and unflinching performance of duties, aside from other cultural dimensions. The general opinion echoed even by contemporary writers is that the *nenko* system arose out of the unique characteristics of Japan's industrial history and culture (Suzuki, 1990). This point, along with the question of uniqueness of the Japanese industrial relations system, has been a subject of recurrent debate even from the 1950s. Taira (1962,1970) has argued that the Japanese wage system, along with with other characteristics of Japanese labor management, was a result of the rational economic calculus of employers during the phase of modern industrial growth. It is associated with neoclassical patterns of growth.

Managerial strategies to wage determination include such techniques as job evaluation, performance appraisal, and the use of management prerogative (i.e. "company rules and regulations"). Business schools approach wage determination in this manner.

The managerial approach doesn't rely upon any economic or social theory to justify the setting of wages within the company. Rules and regulations on enterprise wage determination are based upon existing practice (tradition). The industrial relations approach to wage determination is closely related to the institutionalist approach. The work by Ishida (1976, and jointly with Sano and Koike, 1969) is an example. Institutions involved in the totality of labor-management relations such as collective bargaining define

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10) The objective of Nash bargaining is to achieve a Pareto optimal type of solution (non-zero sum) between a workers' group and the employer. An important reference is I.M. McDonald and R. M. Solow (1981), "Wage Bargaining and Employment", *American Economic Review*, Vol. 71, pp. 896-908.

the parameters of wage determination.

Shimada (1982) explored the possibility of the corporatist approach<sup>11)</sup> to explain the flexibility in wage determination which emerged after the first oil crisis in Japan. In the 1980 Shunto for instance, actual wage increases were much lower than was predicted by conventional wage equations. The corporatist explanation involves political management of wage determination. Shimada argued that in Japan, even without the formal arrangements to represent labor, management and state interests, corporatist type solutions were compatible with macro-economic conditions. Information sharing, enterprise unionism and the prevalence of plant-level bargaining allows formulation and sharing of cooperative strategies between the corporatist actors. The Japanese industrial relations system could be said to feature "corporatism without labor."

### *III. Functional Methods and Techniques*

The focus of the review in this section is upon Japanese wage equations. The review is limited to the computational forms for human capital, and the institutional/structural approach.

There is no question that alongside that of U.S. and European labor market analysis, Japanese wage analyses have reached a level of sophistication in the use of clearly defined theory and a refined, systematic methodology along functionalist standards.

The functional approach requires that methods and concepts are clearly defined, and a set of hypotheses are tested using observed phenomena. Quantitative techniques thereupon provide an advantageous level of precision especially for the purpose of predicting likely trends.

An often cited disadvantage of the functional approach however is that assumptions are supposed to fit the real world, when in most cases these assumptions are not present in the context that a particular problem faces. This criticism is related to the controversy of the supposed "value free" nature of functional methods. For instance, regression analysis assumes a certain unrealistic convergence, i.e. normality in the distribution of observations. This abstract assumption is quite hard to apply in the wage variable, where observations often concentrate at certain points, thereby creating biases. Techniques to remove bias in estimation have been invented, but they are not fully satisfactory.

The general equilibrium approach to wage analysis relies heavily upon competitive specifications of labor supply and demand factors to determine equilibrium rates. Identification of the relevant supply and demand factors to fit a calculus towards equilibrium however tends towards simplification. Feedback mechanisms in the economy ensure a simultaneous outcome among the independent explanatory variables. It is therefore an unjustified simplification to simply point out for instance that one or two supply factors dominate the determination of wages, without considering the linkages involved.

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11) The corporatist approach to industrial relations is quite popular in Great Britain and Australia. For a review of the corporatist approach, see Philippe Schmitter and G. Lehmbruch (editors), *Trends Toward Corporatist Intermediation* (London: Sage Publications, 1982).

The quantitative methods used in the analysis invariably involve not only descriptive statistics, but also regression techniques. The heuristic model usually involves a specification of wages as the dependent variable. The independent variables used generally are some variations of both demand and supply factors. The functional form is often semi-logarithmic, and the estimation technique used ranges from general, step-wise to ordinary least squares. The use of the semi-logarithmic form requires the interpretation of the regression coefficients as the effect upon the dependent variable in percentage terms.<sup>12)</sup> Some log-linear wage equations have logarithmic values on both sides of the equation.

The logarithmic forms are used for computational convenience. The exponentiation of coefficients is as follows:

$$\begin{aligned} \ln W &= (\text{exponent})^a + \sum b_i X_i \\ &= (\text{exponent})^a * e^{b_1 X_1 + b_2 X_2 + \dots + b_P X_P} \end{aligned}$$

In the case of the dummy variables,  $X_i = 0, 1$ :

$$\begin{aligned} \text{If } X_i &= 0, \text{ then } e^{b_i X_i} = 1, \text{ and} \\ \text{If } X_i &= 1, \text{ then } e^{b_i X_i} = e^{b_i} \end{aligned}$$

Many of the wage equations attain high coefficients of determination (R-squared). This reflects grouping of individual observations.<sup>13)</sup>

#### A. Wage Estimation by Use of Human Capital Approach

Human capital theory attempts to explain the wage level of an individual worker as accruing from differences in education, work experience and training.

The general form for the human capital model for Japanese data is as follows (Shimada, 1974; Kuratani, 1973; Stoikov, 1973; Hashimoto and Raisian, 1985):

$$\ln W = a_0 + a_1 S + a_2 S^2 + a_3 X + a_4 X^2 + a_5 T + a_6 T^2 + a_7 Z^2$$

The dependent variable is usually the natural logarithm of the wage (to control for growth). Commonly used as explanatory variables are: years of schooling (S); work experience (X); job tenure at the current enterprise (T), and a vector of exogenous variables (Z). Work experience is usually measured as (AGE – YEARS OF SCHOOLING – 6) in most studies (for instance Nakamura, 1987; Hashimoto/Raisian, 1985).

Some studies do not use a squared form, but only a simple linear equation. Squared forms are usually introduced in the equation to account for a possible marginally increasing or decreasing effect of each variable. Interaction variables are also used, derived from an expected complementary between schooling and experience for instance (Stoikov, 1973). The expectation is that there are diminishing returns to experience both inside and outside the firm. Returns to experience increase, the rate of which depends upon an individual's level of schooling. Once outside experience is greater, there would be smaller

12) Robert J. Thornton and Jon T. Innes, "Interpreting Semilogarithmic Regression Coefficients in Labor Research," *Journal of Labor Research* Vol. 10, No. 4 (Fall 1989) pp. 443–447.

13) See Blalock, Ch. 4 (1964) pp. 102–111. (cited in Stoikov, *JPE* Vol. 81, March-April 1973).

returns to internal work experience. In using Japanese data, emphasis is put upon the effect of firm-specific human capital and training on the wage growth (Hashimoto and Raisian, 1985 for instance). Hashimoto and Raisian also controlled for firm size as an important Z variable. They did not rely solely upon the slope of tenure on earnings, but considered the number of years that such earnings could reach its peak.

Tachibanaki and Taki (1990) uses a variant of the human capital-type wage equation to consider the effect of firm size upon the wage profile of workers who change firms midway in their careers. He used the variables "years of schooling"; "firm size"; and "tenure" to estimate the wage equation, for three occupational groups with two samples each (those who never changed their employer, and those who did).

Although not explicit, Nakamura (1980; and updated in 1987) used a human capital form wage equation to estimate intra-firm wage differentials. His technique illustrated one of the uses of the human capital form in terms of comparative purposes. He used ascriptive factors such as years of employment with the same firm, age and educational background, to compute the differentials. These factors are most commonly associated with the seniority system in Japan. Firm size and occupational differentials are controlled for in the equations. Higuchi also combined human capital variables with business cycle factors to determine whether market fluctuations cause flexibility in the wages of workers with different job tenures. He used the following functional form:

$$\begin{aligned} \text{Change in log } W = & a_0 + a_1S + a_2X + a_3T + a_4T \cdot \text{Change in } P + a_5T \cdot \text{JOB} \\ & + a_6 \text{Change in } P + a_7 \text{JOB} \end{aligned}$$

The dependent variable is the percentage rate of change in real wages (change in log W). The explanatory variables are: years of schooling (S); years of total work experience including those with other employers, (X) computed as (age – years of schooling – 6 years); years of job tenure (T); years of job tenure (JOB); per capita real value added growth rate (change in P).

Ohkusa, Ariga et. al. (1990) utilized a "search theoretic simulation model" to analyze the effects on job-to-job quits by investment in firm specific human capital. They used the estimation by Hashimoto and Raisian (1985) to investigate the extent by which the difference between firm specific human capital investment between the United States and Japan.

Chen (1980) and Kawashima and Tachibanaki (1985) used the basic human capital equation in combination with institutional and structural variables to test various hypotheses involving wage segmentation. Chen's wage generating function is as follows:

$$W = w(\text{FIRM}, \text{TK}, \text{C}, \text{X}, \text{S}, \text{A}, \text{T}, \text{BK})$$

The dependent variable is the wage of the worker. The human capital variables are: schooling index (S); age index (A); knowledge (including work experience) (TK). The knowledge variable is quite interesting. The segmentation variables are: sex (X); the behavioral functions (BK), technical relations (TK) which is really the technology at the workplace; and firm or employer characteristics. Kawashima and Tachibanaki (1986)

used a similar computational form as that of Chen's. However, they used a semilogarithmic form, with the natural log of hourly wages as the dependent variable. They used a battery of dummy or dichotomous variables to explain wage variation. This included education, length of service/tenure, sex, occupation, age and firm size. The most interesting dummy variable is whether the firm belongs to the oligopolistic or competitive sector. This is in accord with their major hypothesis that workers in the oligopolistic and competitive sectors experience wage segmentation, aside from different career patterns and terms and conditions of employment. They confirmed the prevailing discrimination in pay against women workers in Japan.

### B. Institutional and Structural Wage Equations

The institutional approach in contrast relies more upon structural factors in building a wage equation. Most of the analysis requires clear descriptive techniques, which are difficult to quantify. This is especially true when one refers to changes in the segmentation process, or the boundaries which separate wages in the dual labor market. Thus, analysts often resort to "instrumental", "proxy" or "dummy" variables to augment the wage function.

Wage estimation by use of institutional and structural variables has been called "ad hoc statistical approach" by Tachibanaki (1990). It is also referred to as a "descriptive" approach. The objective of the approach is to identify what factors (or variables) are important (or statistically significant) and in combination with each other, provide the greatest degree of explanatory power in the observed wage differentials. This approach does not make use of preconditions required by a previous theoretical explanation, such as human capital theory. Nevertheless, the literature of wage determination is wide enough to allow choice of functional form as a distinct issue from the purely theoretical issues involved.

Sano (1969; 1970; 1981; 1982) in her major works extensively used quantitative techniques to analyze the qualitative factors which shape the outcome of the spring wage offensive as measured by the resultant change in the wage rates (time lag). She introduced a "behavioral model" which introduced as independent variables several aspects of the wage determination process. The focus was upon the role of both labor and management behavior. Sano did not limit herself to a purely functional approach. She also analyzed inductively the interactions between different patterns found in different sectors. The approach combined inductive reasoning with the pure functional quantitative formulation. This approach characterized most of her works on wage determination (Sano, 1963; 1969; 1970 and onward).

In determining the mechanism for wage increases during the annual spring wage offensive in the period 1960–1974, Sano (1980) used the following computational form:

$$W_{it} = a_0 + a_1(X_1 - X_2) + a_2X_2 + a_3X_3 + a_4X_4$$

The dependent variable is the average wage increases for each industry. The independent variables are:

X1: Average per capita net profits for all industries for each year.

X2: Average per capita net profits for each industry for each year.

X3: Annual percentage change in the consumer price index as measure one year earlier.

X4: Percentage of people receiving unemployment benefits in the previous year.

Sano's results indicated that the coefficient for consumer prices was insignificant. (The percentage of workers receiving unemployment benefits in the previous year was totally irrelevant.) Only the ability to pay and its differentials vary in their relative importance from one industry to another. The differentials in the ability to pay by industry, in her view could be considered as the extent of the spillover effect of the Shunto wage rate.

Shimada (1970) computed wage spillovers by using negotiated wage increases as the dependent variable. His explanatory variables are average profits in all industries, and the average profit per worker. Other equations (i.e. the Economic Planning Agency White Papers during the period) used negotiated wage increases based on the pattern setter's negotiated wage increase. Using the pattern setter variable, substantial wage spillovers were found.

In contrast, an important work by Shinkai (1980) used various forms of wage equations to verify the "spillover hypothesis". His results indicated weak evidence for the key industry as pattern setter hypothesis.

As computed by Japan's Economic Planning Agency (1979), the Shunto related wage increases after the 1974 are usually explained by three factors: the ratio of job vacancies to job seekers (UY), the rate of increase in consumer prices (the first quarter values are used, just before the Spring term begins in April) (PC) and the ratio of current corporate profits to the amount of sales in the previous year (PR/S). The dependent variable used was a percentage rate of wage increase of major unionized companies (WS). The computational form was:

$$WS = f(UY, PC, PR/S)$$

Koshiro (1983) augmented the analysis by using for PR/S, the lagged value (one fiscal year) of the average current profit per employee as the profit variable. For WS, he used the average wage increase (absolute amount) as the dependent variable. His results verified the hypotheses that enterprise unions exercise very little wage bargaining power. Further, wage levels are determined primarily by the economic forces of the market.

Ichino (1990) used a similar wage equation to verify the worsening of wage differentials between the small and large enterprises. Explanatory variables are unemployment and price changes over time, with a dummy variable for the period before and after 1955.

#### *IV. Conclusion*

Although the human capital approach became popular in the 1970s, eventually the

institutional and structural approach dominated the analysis of wages in Japan. Statistical measurement (econometric) problems are numerous in human capital theory: censoring bias, omitted variables, endogeneity, job match heterogeneity, and the like.

Internal labor markets, dualism, and segmentation explains various facets of Japanese wage determination in varying degrees of success. Some wage analysts used an "ad hoc" combination of human capital theory in combination with the institutional framework to explain the specific characteristics of the Japanese wage system. The main weakness of the institutionalist approach is the limited ability of the descriptive (empirical) methods to explain the evolution and direction of wages with respect to social and industrial relations.

During periods of rapid economic growth in Japan, wage increases had been well explained by the demand–supply conditions in labor markets. The job offer-application ratio acted as a proxy for excess labor demand, and indirectly for the level of aggregate production. This equation however lost its explanatory ability after the first oil crisis. Since then, consumer prices, enterprise profits and terms of trade (input and output prices) had high explanatory power until the second oil crisis.

In the 1980s, analysts observed a certain degree of wage flexibility in Japan. The ability of conventional quantitative approaches to identify the factors which explain this flexibility has decreased, pointing to the possibility of qualitative variables such as "consensus" and "accommodation" having a greater role in Japanese wage determination. This would obviate the role of an apparent decline in trade union strength as a factor behind such flexibility. Structural and qualitative changes in the Japanese labor force, and the increasing use of managerial strategies and techniques are seen to be the relevant factors in contemporary wage determination in Japan.

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