

# 「所得과 賃金」이 女性의 勞動力 參加에 미치는 影響에 對한 理論的 分析」

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## I. 序 論

勞動力은 經濟成長에 있어서 다음과 같은 두가지 면에서 重要的 역할을 한다. 즉 直接的으로는 生産要素의 供給源이 되고 또한 間接的으로는 人間의 環境에 크게 影響을 미친다. 特히 好況期에는 雇傭增加에 對處하기 위하여 勞動力의 擴大에 關心이 集中되고 反面에 不況期에는 勞動供給自體에 影響을 미치는 雇傭擴大에 關心이 集中된다. 따라서 本研究은 主로 勞動供給原이 되는 勞動力參加, 特히 女性勞動力參加의 行態를 理論的으로 규명함과 同時에 既存研究結果와 理論的 期待를 比較檢討할 것이다.

## II. 二分法 模型

勞動供給理論은 利用可能한 時間의 여러가지 用途의 選擇에 關한 理論이라고 할 수 있다 傳統的 時間配分 理論에 의하면 時間資源은 市場勞動과 家事勞動을 包含한 餘暇의 두가지 用途를 위하여 配分된다. 따라서 餘暇의 需要函數는 다음과 같이 表示될 수 있을 것이다.

$$L=f(W^*, Y)$$

여기에서  $L, W^*, Y$ 는 各各 家事勞動을 包含한 餘暇需要, 餘暇의 機會費用 및 家族所得을 나타낸다. 그런데 餘暇의 機會費用은 二分法 模型에서는 結局 市場勞動代價인 賃金率과 같을 것이다. 그런데 傳統的 理論을 따른다면 所得增加는 곧 餘暇를 增加시킴과 同時에 市場勞動을 減少시킬 것이다. 그러나 市場賃金の 增加는 반드시 餘暇를 減少시키고 市場勞動을 增加시킨다고 斷定的으로 말할 수 없다. 왜냐하면 市場賃金の 增加는 代替效果와 所得效果가 同時에 일어남으로서 이 두 效果를 比較함으로써만 餘暇 및 市場勞動의 變化를 알 수 있기 때문이다. 만약 市場賃金の 餘暇에 대한 代替效果가 所得效果보다 크다면 餘暇에 配分되는 時間은 적어지고 反面에 市場勞動에 配分되는 時間이 많아질 것이다. 그런데 代替效

果와 所得效果의 크기는 先驗的으로 決定될 수 없고 오직 그 社會의 社會經濟的 諸要因에 의해서만 決定될 것이다.

大部分의 研究結果는 代替效果가 所得效果보다 크므로서 女性賃金率의 上昇이 勞動力參加의 增加를 보여주고 있다.

「金」은 1974年「特別雇傭調査」資料를 利用함으로써 韓國의 女性勞動力參加의 決定要因을 찾아내려고 시도한 바가 있다. 그의 結果에 의하면 家族所得은 女性的 勞動力參加率과 負의 關係를 나타내었다. 그러나 資料問題 때문에 賃金의 效果는 찾아낼 수가 없었다. 金自身이 지적한 바와같이 代替效果와 所得效果의 比較는 不可能했다. 그러나 女性勞動需要와 女性賃金이 陽의 關係를 갖는다고 가정한다면 그가 使用한 女性勞動需要의 陽의 係數는 暗黙的으로 陽의 賃金效果를 나타냄과 同時에 代替效果가 所得效果를 支配함을 의미한다.

### Ⅲ. 三分法 模型

上記한 二分法 模型은 家事勞動으로의 時間配分을 고려하고 있지 않다. 만약 家事勞動이 分析에 導入된다면 結果는 간단하지 않다. 즉, 二分法에서는 餘暇時間의 所得效果 및 代替效果는 市場勞動時間의 그것과 表裏關係에 있다. 그러나 三分法에서는 餘暇時間의 減少는 市場勞動과 家事勞動에 영향을 줌으로써 반드시 市場勞動時間을 增加시킨다고 말할 수 없다. 그래서 「베커」와 「그로노우」는 소위 家計生産函數를 導入함으로써 三分法 模型을 開發했다. 兩人的 模型은 거의 비슷하지만 前者는 時間函數와 豫算函數의 制約을 條件으로 하는 最終財貨 및 서비스의 效用을 極大化하려고 한 反面에 後者는 時間 및 豫算의 制約下에 市場購入財貨 및 서비스와 消費時間을 投入함으로써 얻어지는 最終財貨의 生産量을 極大化하려고 시도했다. 傳統的인 效用理論에 의하면 市場購入財貨 및 서비스는 그 自體가 效用을 가지고 있는 것으로 가정된다. 그러나 「베커」와 「그로노우」는 市場財貨와 서비스自體가 效用을 發生시키는 것이 아니고 그것은 오히려 最終財貨 및 서비스의 投入要素로서 家計生産函數에 作用함으로써 最終財貨 및 서비스만이 效用을 發生시킨다. 「그로노우」의 センス에 의하면 家計財貨는 오직 家計勞動의 投入에 의해서만 生産된다. 따라서 豫算 및 時間函數를 制約으로 하는 家計生産函數의 極大化는 바로 最終財貨 및 서비스의 效用의 極大化가 됨으로써 利用可能한 全時間이 市場勞動, 餘暇 및 家計勞動에 配分될 수 있다.

만약 家族所得이 增加한다면 家計生産函數의 모양이 變하지 않는 限 家計財貨의 어떠한 變化도 없이 市場財貨 및 서비스를 增大시킬 수 있다. 結果적으로 餘暇의 增加와 市場勞動의 減少를 초래하게 되는데 이것은 二分法의 경우와 대동소이하다.

그러나 女性賃金이 變化한다면 이것은 市場勞動 및 餘暇의 代替效果와 所得效果 및 家事勞動의 交互代替效果의 크기에 의해서 利用可能한 全時間이 市場勞動, 餘暇 및 家事勞動에

配分, 調整된다. 만약 代替效果가 所得效果보다 크다면 女性市場賃金の 增加는 市場勞動을 增加시킬 것이다. 그러나, 그 逆은 항상 成立하지 않는다. 즉, 代替效果가 所得效果보다 작더라도 市場女性賃金の 增加는 더 큰 交互代替效果가 더 작은 代替效果를 補償할 수 있다면 역시 市場勞動을 增加시킬 수 있다. 結論으로 餘暇가 優等財라면 女性の 市場賃금이 市場勞動에 미치는 效果는 先驗으로 알 수가 없고 代替效果, 交互代替效果 및 所得效果의 크기에 의해서만 결정된다. 反面에 餘暇가 劣等財라면 그의 市場勞動에 對한 效果는 항상 陽일 것이다.

大部分의 事例研究는 餘暇가 優等財임을 나타냄으로써 女性市場賃金の 增加는 家事勞動 및 餘暇를 減少시킴으로써 市場勞動의 增加를 보여주고 있다.

#### IV. 失業率 模型

失業率은 女性市場勞動參加에 對해서 2가지 面에서 影響을 미치는 것으로 알려져 있다 즉, 附加效果와 失望效果가 바로 그것이다. 높은 失業率은 一次勞動力の 많은 部分이 職場으로부터 물러나거나 勞動時間을 줄이게 됨으로써 그들의 家計所得은 一時的으로 減少하게 되는데 이러한 家計所得의 減少내지 損失을 補償하기 위하여 二次勞動力, 즉 女性勞動力이나 他成人勞動力이 勞動市場에 들어가려고 할 것이다. 反面에 不況期에는 二次勞動者가 職業을 얻는데는 상당한 時間 및 非金錢的 勞力이 요구되기 때문에 더 이상 求職活動을 拋棄하고 非經濟活動狀態로 脫落해 버릴지도 모른다. 前者는 附加效果를 의미하고 後者는 失望效果를 의미하게 된다.

만약 失業이 一時的 家族所得과 一時的 賃金率에 미치는 效果가 거의 同一하고 代替效果가 所得效果를 支配하는 보통의 期待를 가정한다면 失望效果는 附加效果를 초과함으로써 失業이 女性の 市場勞動力에 미치는 影響은 負의 方向으로 作用할 것이다.

「金」은 一般失業率과 一次勞動者의 失業率을 使用함으로써 兩效果를 檢證하려고 시도했다. 그의 結果에 의하면 一般失業率의 係數는 負인 反面에(失望效果) 一次勞動者의 失業率 係數는 陽을 나타내었다(附加的 效果). 그러나 이 研究에서는 어느쪽 效果가 큰지를 比較할 수가 없다. 사실 一般失業狀態가 一次勞動失業狀態에 곧 파급될 것으로 생각되기 때문에 一般失業率만으로 兩效果에 影響을 주게될 것이다. 따라서 「金」의 結果에서 보이는 바와 같이 一般失業率의 負의 係數는 失望效果가 附加效果를 支配할 뿐 아니라 失業이 一時的 家族所得 및 一時的 女性賃金에 미치는 影響이 거의 同一하다는 가정下에서 女性市場賃金の 代替效果가 所得效果를 초과함을 뜻하게 된다.

# —The theoretical Analysis of Impact of Income and Wage on Women's Labor Force Participation—

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## I, Introduction

It is well known that labor force plays a central role in the growth of the economy, directly as the supplier of the most important production input, and indirectly as the dominant influence in the human environment. Hence, Studies on the labor force are very useful in both sides. In an economic prosperity, our attention is mainly focused on an increase of labor supply in order to meet increased labor demand. On the other hand, in an economic depression our concern is with the expansion of employment, which in turn affects labor supply itself. This study is mainly concerned with the labor supply, in particular, women's labor force participation.

In Korea, there has been a dramatic increase in employment with the successful implementation of four consecutive five-year economic development plans, the first of which began in 1962. In accordance with a rise in employment, the labor force has also increased remarkably. In particular, around half of the total increment in the labor force was accounted for by the female labor force. While the labor force participation rates of men have increased only slightly or even decreased since the early 1960's, those of women have increased rapidly. Such a rapid increase in the rate of female labor

force participation is likely due to the rapid economic growth and to the successful implementation of a family planning program. Durand<sup>1)</sup> has observed that the male participation rate is highly stable, varying only slightly over time, whereas the female participation rate tends to draw U-shaped curve with the economic development of the country, which means that the female labor force participation tends to decrease till a certain level as economic development proceeds, and after that it tends to increase with economic development. At least in the Korean case, the data of 1960's to 1970's seem to support the latter part of U-shaped curve of Durand's hypothesis in terms of female labor force participation. Associating the increasing rate of female labor force participation with economic growth during the last decade and a half of the national efforts, we can say that an increase in women's labor force participation has made a significant contribution to the rapid economic growth of Korea.

Then, labor force participation in the labor market has been known to be influenced by socio-demographic-economic variables. This study is mainly concerned with economic variables, especially, income and wage by which married women's labor force participation is known to be affected. In particular, the purpose of this study is not to identify determinants of women's labor force participation through empirical study, but to survey some of the theoretical models and gauge possibilities of new models, which might contribute to the future studies of the women's labor force behavior.

## II. Pattern of Growth in the Labor Force

During the last twenty years (1960-1979), as Table 1 shows, the labor force grew from 7.5 million in 1960 to 14.2 million in 1979. This indicates an overall rate of increase of 3.6 percent; annually. In particular, the female labor force increased from 2.2 million in 1960 to 5.4 million in 1979; an average annual increase of 5.5 percent while the male labor force grew from 5.4 million in 1960 to 8.8 million in 1979 for an average annual increase of 2.8 percent. Meanwhile, the percentage distribution of the male and female labor force was 71.2 percent and 28.9 percent in 1960, respectively, while in 1979 the percentages were 62.1 and 37.9 respectively. Considering the above rates of labor force growth, we can see that the Korean labor force has

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1) Jahn D. Durand, *The Labor Force in Economic Development*, Princeton University press, 1975

**TABLE 1. SIZE OF LABOR FORCE AND AVERAGE ANNUAL RATE OF THE INCREASE**

Size of the Labor Force (thousand person)

Years	Total	Male	Female
1960*	7,543 (100.00)	5,367 (71.2)	2,156 (28.9)
1965	8,859 (100.00)	5,808 (65.6)	3,051 (34.4)
1970	10,199 (100.00)	6,516 (63.9)	3,683 (36.1)
1975	12,340 (100.00)	7,884 (63.9)	4,456 (36.1)
1979	14,206 (100.00)	8,820 (62.1)	5,386 (37.9)

Average Annual Rate of the Increase of the Labor Force (%)

Years	Total	Male	Female
1960-1965	3.49	1.64	8.30
1965-1970	3.03	2.44	4.14
1970-1975	4.20	4.20	4.20
1975-1979	3.78	2.97	5.21
1960-1979	3.63	2.81	5.46

Data Sources: \* *Population and Housing Census Reports*, 1960, Bureau of Statistics, Economic Planning Board, Korea.

*Annual Report on the Economically Active Population Survey*, 1979, Bureau of Statistics Economic planning Board, Korea.

been steadily increasing, and that, in particular, an increase in the female labor force has been much faster compared with that of males.

The increase in the labor force can also be explained by an increase in the labor force participation rate expressed as the proportion of the population who are in the labor force out of the eligible population. As shown in Table 2, the labor force participation rate for both sexes was 49 percent in 1960, and this rose to 58 percent in 1979. The labor force participation rate of women was much lower than that of men, 27.0 percent versus 73.0 percent in 1960, and 42 percent versus 74 percent in 1979, respectively. The reason put forward in explaining the generally lower labor force participation rate of women is found in the traditional role that a woman plays as the "homemaker" in the family. In allocating her total time resources between home and market production,

**TABLE 2. THE LABOR FORCE PARTICIPATION RATES (%) (1960—1979)**

Years	Both	male	Female
1960*	49.0	73.4	26.8
1965	55.6	76.6	36.5
1970	55.9	75.1	38.5
1975	56.5	74.5	39.6
1979	57.6	74.1	42.2

Data Sources: \* *Population and Housing Census 1960* Bureau of Statistics, Economic planning Board, Korea  
*Annual Report on the Economically Active Population Survey, 1979*, Bureau of Statistics Economic planning Board Korea.

the family usually assigns the responsibility of home production to the wife who is generally better trained for this function than the husband or any other family member. However, an increase in the female labor participation rate was much larger than that of the male during the last twenty years as the female rate grew by 6 percentage points, while that of the male increased only by 1 percentage point.

### III. Dichotomy Model

The study of labor force participation is that of the labor supply. The theory of labor supply is a theory of choice among alternative uses of one's time. According to the conventional time allocation theory, if choice of time resources is restricted to the market work, not considering homework and leisure as an exhaustive dichotomy, the demand function of leisure can be expressed as follows:

$$(1) L=f(W^*, Y)$$

where

$L$ =the quantity of leisure demanded including home work

$W^*$ =opportunity cost of leisure

$Y$ =family income

Then, opportunity cost of leisure will be equal to the wage rates of the market work ( $W$ ) at the dichotomy model in which total available time is allocated to the market work and leisure. Thus,  $W^*=W$ .

We expect  $\left(\frac{\partial L}{\partial W}\right)^s < 0$  when change in wage rate can be compensated for by that in income, and  $\frac{\partial L}{\partial Y} > 0$  assuming that leisure is a superior goods. Then, total time available is defined as;

$$(2) L + G = T \text{ or } L = T - G$$

where:

$G$  = the quantity of the market work

$T$  = total available time resources

Substituting (2) into (1) :

$$(1)' L = T - G = f(W, Y)$$

Differentiating (1)' partially, respectively, in terms of  $W$  and  $Y$ , and rearranging then, we get:

$$\left(\frac{\partial G}{\partial W}\right)^s > 0, \text{ and } \frac{\partial G}{\partial Y} < 0$$

This means that the effect of changes in income is always negative, while the effect of changes in the wage rate compensated for by income is positive on the premise that leisure is a normal good or a superior good. The effect of the wage rate will carry both substitution and income effects on the market work supplied. Expressing the two effects in terms of elasticities we have:

$$(3) E(G, W) = (G, W)^s + \frac{V}{Y} \cdot E(G, Y)$$

where,

$V = G \cdot W$  = total market work earning

$$E(G, W) = \frac{\partial G}{\partial W} \cdot \frac{W}{G} = \text{wage elasticity of the market work uncompensated}$$

for by family income (total effect)

$$E(G, Y) = \frac{\partial G}{\partial Y} \cdot \frac{Y}{G} = \text{income elasticity}$$

$$\frac{V}{Y} \cdot E(G, Y) = \text{income effect}$$

$$E(G, W)^s = \left(\frac{\partial G}{\partial W}\right)^s \cdot \frac{W}{G} = \text{wage elasticity of market work compensated}$$

for by family income (substitution effect)

Thus,  $E(G, W)^s > 0$  since  $\left(\frac{\partial G}{\partial W}\right)^s > 0$  and  $E(G, Y) < 0$  since  $\frac{\partial G}{\partial Y} < 0$ .

Hence, it is seen that the substitution effect,  $E(G, S)^s$  is always positive and the



income effect,  $\frac{V}{Y}E(G, Y)$  is always negative as long as leisure is a superior good. However, it can not be determined a priori which of the two effects is larger in absolute value. It can only depend on the findings of empirical studies.

Most empirical cross-sectional studies show that the substitution effect exceeds the income effect. Mincer and Cain tested this by using cross-sectional aggregate data of the United States.<sup>2)</sup> They used linear regression models including child, unemployment and education variables in addition to wage and income variables. According to their findings, the effect of the wage rate is much larger than the size of the income effect in terms of absolute values. This means that the substitution effect predominates over the income effect which is rationalized on the theoretical grounds.

Long tried to test the relationship between labor force participation by married women and household income.<sup>3)</sup> His findings showed negative income effects, which deviated from theoretical grounds. The difficulty in interpreting this results, however, is that income and substitution effects are mixed together in one variable  $Y$ . Since  $Y$  and  $W$  are correlated, their separate effects could not be observed even in an approximate way.

Belloc's empirical studies<sup>4)</sup> tried to show the relationship between married women's labor force participation and incomes of males and the ratio of females employed in manufacturing & domestic services to all females employed. According to his findings, married women's labor force participation is negatively related to income variable and positively related to the employment ratio. Then, employment ratio variable reflects an industrial structure that designates a high demand for the work of females and thereby acts as a proxy for the wage rate. Positive relationship between married women's labor force participation and the employment ratio as a proxy for the wage rate implies that positive substitution effect predominates over negative income effect.

Kim<sup>5)</sup> tried to find out the determinants of Korean married women's labor force participation by using the city-level aggregate data drawn from the 1974 Special Labor

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2) Glen G. Cain, *Married Women in the Labor Force*, The University Chicago Press, 1966. p 23-25

3) Clarence Long, *The Labor Force under Changing Income and Employment*, National Bureau of Economic Research (Princeton, Princeton University Press)

4) Nebra B. Belloc, Labor Force Participation and Employment Opportunities of Women, *Journal of the American Statistical Association*, XLV (Sept. 1950) p 401-410

5) Sockon Kim, *Labor Force Behavior and Unemployment in Korea*, Korea Development Institute, Seoul, Korea, 1976 (published in Korean)

Force Survey.

The coefficient of family income,  $Y$ , proxied by the husbands' income is negative and statistically significant. As the income indicates, the greater is the husband's income, or family income, the less willing married women will be to participate in the labor market. This is supporting the theoretical grounds. Unfortunately, it is impossible to find out wage effect because of women's wage rate data problem.

As Kim himself pointed out, it is impossible to make comparison between substitution and income effects at a glance. However, Kim's findings seem to be sufficient to explain substitution and income effects on the contrary to his pessimistic confession by using demand for female workers and unemployment ratio variables. If we assume that demand for female workers positively affects females' wage rates, an increase in demand for female workers will consequently increase female wage rate, which in turn will affect women's labor force participation. Hence, as Kim's findings show, positive coefficient of demand for female workers implicitly implies positive total wage effect, which means that positive substitution effect dominates negative income effect.

Similarly, unemployment rate also seems to be very good proxy for wage rate. It will be discussed at chapter V because the impact of the unemployment rates on wage rate and labor force participation is complicated.

#### IV. Trichotomy Model

The above simple dichotomy model did not consider allocation of total available time resources to work at home. It means that income and substitution effects of leisure time are automatically consistent with income and substitution effects of the market work time, respectively. Considering work at home, it is not necessarily true because an a decrease in leisure time might be allocated to homework time with the market time remaining the same or even decreasing. Hence, Becker<sup>6)</sup> and Gronau<sup>7)</sup> constructed the trichotomy model-market work, leisure, homework-by introducing so-called household production function. Models of both economists are almost similar. However, Becker maximized utility subject to time and budget constraints, while Gronau maximized

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6) Becker, Gary S. "A Theory of the Allocation of Time" *Economic Journal*, 75 (September 1965), p. 495-517

7) Reuben Gronau, "Leisure, Home Production, and Works—the Theory of the Allocation of Time Revisited" *Journal of Political Economics* (December, 1977) p 1099-1123

the amount of commodity which is a combination of goods & services and consumption time or leisure subject to time and budget constraints. Then, Becker's utility function can simply be translated into Gronau's production function.

According to Becker,

$$(4) U = U(Z_1, \dots, Z_m)$$

$$(5) \text{ subject to } Z_i = f_i(x_i, T_i)$$

where,

$U$  = utility function of all commodities

$Z_i$  = Commodities (e.g. the seeing of a play, sleeping, etc.)

$x_i$  = a vector of market goods

$T_i$  = a vector of time inputs used in producing the  $i$ th commodity

At equation (5), if all  $Z_i$ 's can be maximized, utility function is simply maximized assuming well-behaved utility function. The former is Gronau's sense while the latter is Becker's. According to the traditional utility theory, market goods and services are assumed to be themselves the agents which carry utility. However, Becker and Gronau have an insight into the sense that market goods and services are not themselves the agents which carry utility but are rather inputs in a process that generates commodities (or characteristics) which, in turn, yield utility.

The following is the approaches of time allocation by Gronau.

Let there be a single-person household.

$$(6) Z = Z(X, L)$$

where,

$Z$  = the amount of commodity

$X$  = total consumption of goods and services as inputs composed by market goods and services ( $X_M$ ) and home goods and services ( $X_H$ )

$L$  = Consumption time or leisure time.

The commodity can be produced by a combination of goods & services and consumption time.

$$(7) X = X_M + X_H$$

$$(8) X_H = f(H)$$

where  $H$  stands for homework time. Home goods are produced by work at home. He assumes well-behaved production function which is subject to decreasing marginal productivity. That is,  $f' = \frac{dX_H}{dH} > 0$  and  $f'' = \frac{d^2X_H}{dH^2} < 0$ .

$$(9) X_M = WN + V$$

where,

$W$  = wage rate

$N$  = market work

$V$  = non-wage income

Market goods and services can be purchased with wage income and non-wage income.

$$(10) L + H + N = T$$

where  $T$  stands for total available time resources. Equation (10) represents that total available time,  $T$  is allocated to leisure, homework time and market work time.

We can obtain the optimum commodities and time allocations by maximizing  $Z$  function subject to (9)—budget constraint and (10)—time constraint.

$$\text{So, } G = Z(X, L) + \lambda(WN + V - X_M) + \mu(T - L - H - N)$$

where  $\lambda$  and  $\mu$  stand for Lagrange's multipliers. Taking partial derivative, respectively, in terms of  $X$  and  $L$ , and rearranging, we can get :

$$(11) \frac{\partial Z / \partial L}{\partial Z / \partial X} = f' = W^* = W$$

where  $W^*$  stands for the shadow price of time.

This means that optimum condition calls for the marginal product of work at home to equal the marginal rate of substitution between goods and time. If we assume pure competitive market, the marginal rate of substitution between goods and consumption time and marginal product of work at home will also equal the real wage rate,  $W$  (that is,  $W^* = W$ )

The above equilibrium conditions can be simply expressed as a diagram.

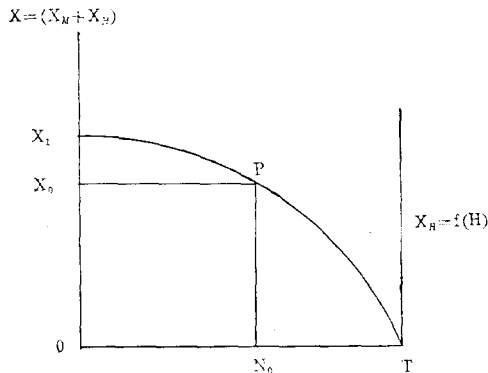
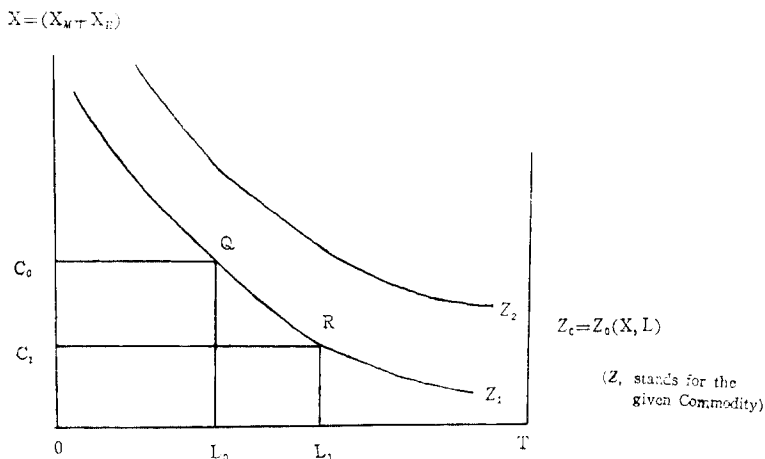


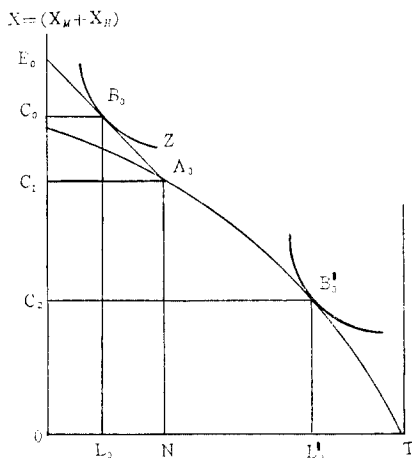
Figure 2

As shown in figure 2, a point,  $X_1$  represents that home goods and services as inputs ( $OX_1$ ) can be produced by using total available time in production of  $X_H$ , whereas another point,  $T$  represents that nothing of home goods and services can be produced by using nothing of total available time. On the other hand, at point  $P$ ,  $OX_0$  of  $X_H$  can be produced by use of home time,  $N_0T$ .



**Figure 3**

Figure 3 represents isoquant curves of the commodities. Thus,  $Z_2 > Z_1$ . We can produce commodities,  $Z_1$  either by use of  $OC_0$  of goods and services (including home goods and service) as input and  $OL_0$  of leisure, or by use of  $OC_1$  and  $OL_1$ .



**Figure 4**



leisure is a normal good, whereas market work will be reduced from  $L_0N_2$  to  $L_1N_2$ . In other words, increased leisure will be accomplished at the expense of market work without any change in work at home.

## 2. The Effect of Change in Wage Rates.

Again, suppose that wage rate increases. Then, budget line will be steeper than before. Figure 6 shows the equilibrium situation due to an increase in wage rate.

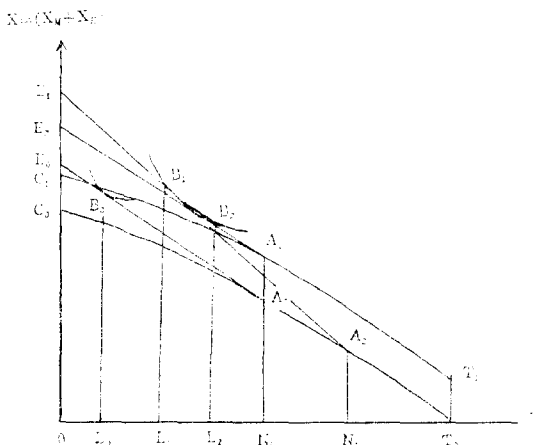


Figure 6

If wage rate increases, real income will also increase, which home goods production function will shift from  $C_0T_0$  to  $C_1T_1$ . As mentioned at figure 5, however, increased real wage rate will not accompany any change in work at home. In other words, increases in the market wage rate will only bring about cross substitution effect or price effect in terms of work at home without any income effect ( $N_0N_1$  is cross substitution effect). On the other hand, at first the increased market wage rate will bring about an increase in leisure by  $L_0L_2$  from  $OL_0$  to  $OL_2$  through an increase in real income, which is income effect. Again, if income level remains the same as before, say, if increased real income is compensated for, an increase in market wage rate will reduce leisure by  $L_1L_2$  from  $OL_2$  to  $OL_1$  because shadow price of leisure will increase (substitution effect). However, change in market work is still indeterminate because it is caused by changes in both leisure and work at home.

$$\text{Then, } L_0N_0 = L_0L_1 + L_1L_2 + L_2N_0$$

$$L_1N_1=L_1L_2+L_2N_0+N_0N_1$$

If we assume that increase in market wage will increase market work, then,

$$L_1N_1>L_0N_0$$

$$L_1L_2+L_2N_0+N_0N_1>L_0L_1+L_1L_2+L_2N_0$$

$$\text{or } L_1L_2+N_0N_1>L_0L_1+L_1L_2$$

where,  $L_1L_2$ =substitution effect in terms of market works

$N_0N_1$ =cross substitution effect in terms of work at home

$L_0L_1+L_1L_2$ =income effect in terms of market work.

As seen at figure 6, substitution effect is positive and income effect is negative and cross substitution effect is negative in terms of work at home, assuming well-behaved production function and leisure as superior goods. If we set  $L_1L_2=S_M$ ,  $N_0N_1=S_H$  and  $L_0L_1+L_1L_2=I_M$ , then  $S_M+S_H>I_M$ , in term of absolute value. If substitution effect ( $S_M$ ) is larger than income effect ( $I_M$ ), an increase in market wage rate will clearly cause an increase in the market work. However, converse does not always hold. Even if substitution effect is smaller than income effect, an increase in the market wage rate can also bring about an increase in the market work if larger cross substitution effect ( $S_H$ ) compensates for smaller substitution effect ( $S_M$ ). Thus, when we say substitution effect, we will have to include not only substitution effect of market work itself, but also cross substitution effect of work at home. At the above diagram, total substitution effect composes of both  $L_1L_2$  and  $N_0N_1$ . Even if leisure is inferior goods, the above hypothesis will hold. If leisure is inferior goods, point  $L_1$  will be located at the left of point  $L_0$  at the figure 6.

$$L_0N_0=L_0L_2+L_2N_0 \text{ and } L_1N_1=L_0L_1+L_0L_2+L_2N_0+N_0N_1$$

If  $L_1N_1>L_0N_0$ , then  $L_1L_0+L_0L_2+L_2N_0+N_0N_1>L_0L_2+L_2N_0$

Here,  $L_1L_0+L_0L_2=S_M$ ,  $N_0N_1=S_H$ , and  $L_0L_2=I_M$ s Thus  $S_M+S_H>I_M$

In other words, if leisure is an inferior goods, an increase in the market wage will reduce leisure and market work will increase more than before, given the same decrease in work at home as before.

In summary, if leisure is a superior goods about the market wage rate, the effect of the market wage rate on the market work is indeterminate, which is determined by the magnitudes of all of the substitution, cross substitution and income effects, whereas its effect on the market work is always positive if leisure is an inferior goods.

Most empirical studies are supporting Becher's and Gronau's theoretical grounds.



According to Block's empirical study<sup>8)</sup> by using the U.S. data, the findings are much more specific, distinguishing between income and substitution effects. An increase in the women's wage rates increase her supply of labor and reduces both work at home and leisure. It means that substitution effect including cross substitution exceeds income effect. And his findings show that leisure is a normal goods or a superior goods as a rise in non-wage income increases her leisure.

Also, Gronau<sup>9)</sup> showed the similar results by using the 1972 panel of the Michigan Study of Income Dynamics. He focused on the income effect on work at home by the personal employment status. According to his findings, when wife is not employed, her work at home is negatively affected by and her leisure is positively affected by her unearned income and her husband's wage rate. In addition, her potential wage rate does not affect her allocation of time.

When the woman is employed, the husbands' wage and unearned income have significant positive effect on leisure, but no effect on work at home. Thus, in the case of the employed women, the above theoretical grounds are very much supported.

In Korea, any study through trichotomy model has never been carried out. As mentioned, Kim's study was carried out by using dichotomy model. It seems to be due to data problem. Even if an increase in nonwage income or family income reduces market work as shown at kim's findings, we can not know whether reduction in the market work was accomplished by an increase in leisure or by an increase in homework. In other words, market work might have been reduced only by an increase in leisure without any change in homework.

## V. Unemployment Rate Model

Primary workers like the heads of families are firmly attached to the labor force over the short run in order to support their families, although they, of course, may move in and out of the status of employed or unemployed. However, the labor force participation of secondary workers not having primary responsibility for support of their families, will largely determine the size of the labor force in the short run depending

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8) Block, F. "The Allocation of Time to Market and Non-Market Work within Family Unit". *Technical Report No. 114*. Institute of Mathematical Studies of Social Science, Stanford University, November, 1973

9) Ibid, p 1113-1118

on the swing in the business environment.

A high unemployment rate indicates that large numbers of the principal breadwinners are forced to go out of the market work or to reduce work hours, that the incomes of their families are undergoing a "transitory" decline, and that to make up for this income loss, other adults in the family, for example, the wives, enter the labor force. On the other hand, a high unemployment rate indicates an unfavorable market for suppliers of labor. Therefore, it might make them give up their participation in the labor market. A person entering the labor force is likely to experience a longer period of waiting and searching for a job, or to accept a less attractive job, or both. There are, then, plus and minus factors involved, and the net effect of unemployment is not clear a priori. As we know very well, the former response to high rates of unemployment is called "the Additional Worker Effect"<sup>10)</sup> and the latter, "the Discouraged Worker Effect"<sup>11)</sup>

A simplified labor supply function can be expressed as follows:

$$(13) G = g(Y, W)$$

where,  $G$  = female market work

$Y$  = a normal or permanent family income

$W$  = a normal or full-time market wage rate of women

Adding to (13) other variables which will reflect the current state of the labor market, we can get:

$$(14) G = h(Y, W, Y^t, W^t)$$

where  $Y^t$  and  $W^t$  are the transitory income and market wage rate of married women.<sup>12)</sup> We expect:

$$\frac{\partial G}{\partial Y^t} < 0 \text{ and } \left( \frac{\partial G}{\partial W^t} \right)^s > 0, \text{ where } \frac{\partial G}{\partial Y^t} = \text{income effect}$$

$$\left( \frac{\partial G}{\partial W^t} \right)^s = \text{substitution effect}$$

It is reasonable to assume that the unemployment rate,  $U$ , will represent large portions of the transitory changes in income and, in addition, will capture some of the non-wage adjustments to changes in employment conditions-tightening or relaxing hiring

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10) W. S. Woytinsky, *Additional Workers and Volume of unemployment in the Depression*, Washington, D. C.: Social Science Research Council, 1940.

11) D. D. Humphrey, "Alleged Additional Workers in the Measurement of Unemployment", *Journal of Political Economy*, June, 1940.

12) This concept has been borrowed from the concepts of "transitory" and "permanent" income, Milton Friedman, *A Theory of the Consumption Function*, Princeton; Princeton University Press, 1957.

standards, work assignments, and the like.<sup>13)</sup> Hence, we may postulate;

$$(15) Y^t = Y^t(U)$$

$$(16) W^t = W^t(U)$$

We expect that  $\frac{\partial Y^t}{\partial U} < 0$  and  $\frac{\partial W^t}{\partial U} < 0$ .

Substituting (15) and (16) into (14), we get;

$$(17) G = h(Y, W, Y^t(U)W, (U))$$

Taking partial derivatives with respect to U, we get;

$$\frac{\partial G}{\partial U} = \frac{\partial G}{\partial Y^t} \cdot \frac{\partial Y^t}{\partial U} + \left( \frac{\partial G}{\partial W^t} \right)^s \cdot \frac{\partial W^t}{\partial U}$$

Then, the term,  $\frac{\partial G}{\partial Y^t} \cdot \frac{\partial Y^t}{\partial U}$ , representing the additional worker effect is positive since  $\frac{\partial G}{\partial Y^t}$  and  $\frac{\partial Y^t}{\partial U}$  are all negative, while the term,  $\left( \frac{\partial G}{\partial W^t} \right)^s \cdot \frac{\partial W^t}{\partial U}$ , representing the discouraged worker effect, is negative since  $\left( \frac{\partial G}{\partial W^t} \right)^s$  is positive and  $\frac{\partial W^t}{\partial U}$  is negative. Hence,  $\frac{\partial G}{\partial U}$  can be positive or negative as  $\frac{\partial G}{\partial Y^t} \cdot \frac{\partial Y^t}{\partial U}$  is larger or smaller in absolute value than  $\left( \frac{\partial G}{\partial W^t} \right)^s \cdot \frac{\partial W^t}{\partial U}$ . Assuming that the responsiveness of unemployment to family income and market wage rate is equal to each other, that is,  $\frac{\partial Y^t}{\partial U} = \frac{\partial W^t}{\partial U}$ , then  $\frac{\partial G}{\partial U} = \left( \frac{\partial G}{\partial Y^t} + \left( \frac{\partial G}{\partial W^t} \right)^s \right) \frac{\partial Y^t}{\partial U} = \left( \frac{\partial G}{\partial Y^t} + \left( \frac{\partial G}{\partial W^t} \right)^s \right) \frac{\partial W^t}{\partial U}$

Again, assuming the usual expectations that the substitution effect exceeds the income effect, that is  $\left| \frac{\partial G}{\partial Y^t} \right| < \left| \left( \frac{\partial G}{\partial W^t} \right)^s \right|$  or  $\frac{\partial G}{\partial Y^t} + \left( \frac{\partial G}{\partial W^t} \right)^s > 0$ , then  $\frac{\partial G}{\partial U} < 0$  since  $\frac{\partial Y^t}{\partial U}$  and  $\frac{\partial W^t}{\partial U}$  are all negative. This means that the discouraged worker effect dominates the additional worker effect on the premise that unemployment influences the transitory family income and wage rates in the same magnitude and that substitution effect exceeds income effect.

Hansen<sup>14)</sup> tested the above hypotheses by using monthly labor survey data. His findings showed that the additional and the discouraged worker effects are offset each other.

Kim tried to test both effects by using general and primary workers' unemployment

13) Melvin W. Reder, "A Theory of Occupation Wage Differentials" *American Economic Review*, XLV, December, 1955.

14) W. L. Hansen, "Cyclical Sensitivity of the Labor Force", *American Economic Review*, Vol. II. June, 1961. pp 299-309.

rates, respectively. The coefficient of the general unemployment rates was negative (the discouraged worker effect), while that of the primary workers' unemployment rates was positive (the additional worker effect). However, it will be likely to be very difficult to make comparison between both effects with the same unemployment rates, say, the general unemployment rates. In fact, the general unemployment tends to affect the primary workers' unemployment. It means that the general unemployment rates will affect both effects. Thus, in Kim's findings, the negative coefficient of general unemployment rates implies not only that the discouraged worker effect predominates over the additional worker effect, but also that substitution effect of the women's wage rates exceeds income effect, assuming that  $\frac{\partial Y^t}{\partial U} = -\frac{\partial W^t}{\partial U}$ .

## VI. Summary and Conclusion

Women's total available time is assumed to be allocated to market work and leisure including home work in the traditional dichotomy model, whereas it is assumed to be allocated to market work, leisure and homework in the trichotomy work. Today's home economists constructed the trichotomic model by using household production function. They have an insight into the sense that market goods and services are not themselves the agents which carry utility but are rather inputs in a process that generates commodities which yield final utility. In dichotomic model, market work will increase only if the substitution effect exceeds the income effect. However, in trichotomic model, substitution, cross substitution and income effects must be considered simultaneously. If leisure is a superior goods about the market wage rate, the effect of the market wage rate on the market work is indeterminate, which is determined by the magnitudes of all of the substitution, cross substitution and income effects, whereas its effect on the market work is always positive if leisure is an inferior goods. In other words, even if an increase in family income reduces women's market work, we can not definitely judge whether reduction in the market work was accomplished, by an increase in leisure or by an increase in homework. It suggests that the coming studies on women's labor force participation be carried out in the direction of three dimensions.

Then, most of empirical studies show positive relationship between market work and wage rate, negative relationship between leisure and wage rate, and negative relationship between work at home and wage rate.

Unemployment rates also affects women's market work very much. Then, the effect of unemployment on market work is indeterminate. Assuming that the substitution effect exceeds the income effect and that the responsiveness of unemployment to family income and market wage rate is equal to each other, its effect on market work is negative, which means that the negative discouraged worker effect dominates the positive additional worker effect.

In a Korean empirical study, women's labor force participation was negatively related to the family income. However, wage effect could not directly be caught because of women's wage rate data problem. However, it seems to be found out indirectly by investigating the effects on women's labor force participation of demand for female workers and unemployment rates. If we assume that demand for female workers positively affects females' wage rates, positive coefficient of demand for female workers implicitly implies positive total wage effect, which means that positive substitution effect dominates negative income effect assuming dichotomic model. The negative unemployment coefficient also means that the substitution effect exceeds the income effect through predominance of the discouraged worker effect over the additional worker effect under assumption that the effects of unemployment rates on transitive income and women's wage rates are equal to each other.

### References

1. John D. Durand, *The Labor Force in Economic Development*, Princeton University Press, 1975.
2. Glen G. Cain *Married Women in the Labor Force*, The University of Chicago Press, 1966, p 23-25.
3. Clarence Long, *The Labor Force Under Changing Income and Employment*, National Bureau of Economic Research (Princeton University Press)
4. Nebra B. Belloc, Labor Force Participation and Employment Opportunities of Women, *Journal of the American Statistical Association*, XLV(september, 1950), p401-10.
5. Becker, Gary S. "A Theory of the Allocation of Time" *Economic Journal*, 75 (September 1965) p 493-517.
6. Reuben Gronau, "Leisure, Home production, and Work the Theory of the Allocation of Time Revisited", *Journal of Political Economics*(December 1977),

p 1099-1123.

7. Block, F. "The Allocation of Time to Market and Non-Market Work within Family Unit", *Technical Report no. 114*, Institute of Mathematical Studies of Social Science, Stanford University, November 1973.
8. Sookon Kim, *Labor Force Behavior and Unemployment in Korea*, Korea Development Institute, Seoul, Korea, 1976 (Published in Korean)
9. Milton Friedman, *A Theory of the Consumption Function*, Princeton; Princeton University Press, 1957.
10. Melvin W. Reder, "A Theory of Occupation Wage Differentials" *American Economic Review*, XLV, December, 1955.
11. W.L. Hansen, "Cyclical Sensitivity of the Labor Force," *American Economic Review*, Vol. II. June, 1961.
12. W. S. Woytinsky, *Additional workers and volume of unemployment in the Depression*, Washington, D.C.; Social Science Research council, 1940
13. D.D. Humphrey, "Alleged Additional worker in the Measurement of unemployment", *Journal of political Economy*, June, 1940.
14. William G. Bowen and T. Aldrich Finegan, *The Economics of Labor Force participation*, Princeton, new Jersey, princeton university press, 1969.
15. Mahar Mangahas and Teresa Jame-Ho, *Income and Labor Force participation Rates of women in the Philippines*, Discussion paper No. 76-3, Institute of Economic Development and Research, School of Economics, university of the Philippines, January, 1976.