

Chapter Four Labour Supply over the Life Cycle



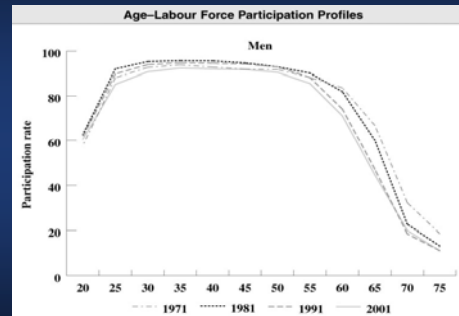
Prepared by Dr. A. Noordeh
York University
Assisted by I. Bershad

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Labour Force Participation Profiles



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Learning Objectives

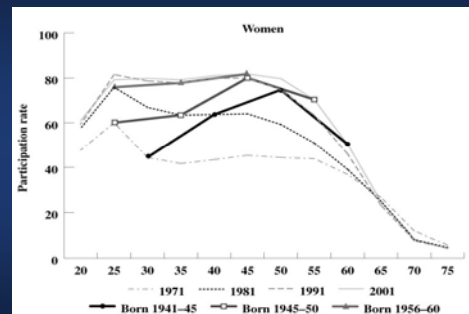
- Labour Supply Patterns
- Lifetime Planning and Wage Elasticity
- Labour Supply Over the Lifetime
- Household Production and Economics of Family
- Fertility and Women's Labour Supply Decisions
- Retirement Decision and Pensions
 - Old Age Security
 - CPP/QPP
 - Employer-Sponsored Occupational Pension Plans

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Labour Force Participation Rates



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Labour Force Participation Rates

- Women
 - Data more complicated to interpret
 - Society/economic factors influence women's participation rates
 - Generally shaped like men's participation
 - Slower entry into labour market
 - Has been rising since 1971

Dynamic Life Cycle Model

- Basic Assumptions:
 - preferences over consumption and leisure today and in the future
 - maximize utility function
 - optimize consumption and leisure in each period of time given expected lifetime budget constraint

Dynamic Life Cycle Model

A model based on the assumption that individuals plan out their lifetime supply of labour given their expected economic environment (specifically wages and other income). Thus, the labour supply decision in any one time period is connected to the decisions made in all time periods.

Dynamic Life Cycle Model

- Using income-leisure model over life time:
 $U = u(C_1, C_2, C_3, \dots, C_N; l_1, l_2, l_3, \dots, l_N)$
Where,
U = Utility function over life time, N
C = Consumption
I = Leisure

Dynamic Life Cycle Model

Income constraint in one period:

- Assume: $Y = W \cdot H$ and $H = (T - I)$,
- Thus, $Y = W(T - I)$, or
- $Y = W \cdot T - W \cdot I$, or $Y + W \cdot I = W \cdot T$
- But, Since $Y = C$
Then: $C + W \cdot I = W \cdot T$
- **This is the income constraint for a given period**

Dynamic Life Cycle Model

- Optimization:
Max. $U = u(C_1, C_2, C_3, \dots, C_N; I_1, I_2, I_3, \dots, I_N)$
Subject to the Constraint,
$$\sum C_i + \sum W_i \cdot I_i = \sum W_i \cdot T$$

All measured in present values

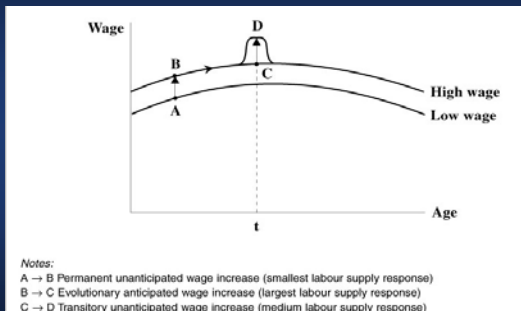
Dynamic Life Cycle Model

- Adding time dimension to the basic income-leisure model:
$$\sum C_i + \sum W_i \cdot I_i = \sum W_i \cdot T$$
- To make the above relationship more meaningful we should calculate the future values in terms of their **Present Values**

Dynamic Life Cycle Model and Wage Changes

- Substitution and income effects differ depending on
 - permanent or temporary wage change
 - anticipated or unanticipated wage change
- Labour supply response will differ depending on the source of the wage increase

Dynamic Life Cycle Wage Changes



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Household Production

- Basic Framework
- Using conventional Utility Maximization Model:
Max. $U = f(Z_1, Z_2, Z_3, \dots, Z_n)$
 Where: $Z_i = g_i(X_1, X_2, \dots, X_n; h_i)$,
 X = market purchased goods,
 h = time spent producing Z with X
- Main Point: "Leisure" is not a purely separate good. It is also an input in producing utility from consumption.

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Household Production

- Households as producers as well as consumers
- The household's allocation of its scarce time resources (pure leisure, household work and other activities to facilitate consumption)
- Expanding the consumer demand analysis so that the price of a good includes the time costs of obtaining utility from it

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Fertility and Childbearing

- Important in understanding women's labour supply – hard to determine since children and LM decisions are joint
- Variables affecting fertility decision
 - income
 - cost of child(ren)
 - price of related goods
 - tastes and preferences
 - technology advances

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Fertility and Childbearing

Income

- Positive relationship between income and the desired number of children
- Contraceptive knowledge and the cost of having children tend to be related to the income variable
- Difficult to separate the pure effect of income on decision (but children are “normal goods”)

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Fertility and Childbearing

Price of Related Goods

- Dramatic changes in private costs can impact the decision to have children
- A rise in the price of complementary goods (medical, daycare, education, etc.) would reduce desired number of children
- Fall in price (public subsidies) could encourage larger family sizes (e.g. public education, daycare subsidies, free or subsidized health care, family allowance, child tax credits)

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Fertility and Childbearing

Price and Cost of Children

- The demand for children is negatively related to the price or cost of having children
- The main cost is income foregone by spouse
- Increase in potential earnings can have both an income (positive) and substitution (negative) effect on decision to have children

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Fertility and Childbearing

Tastes and Preferences

- Women's liberation movements
- Family planning
- Change in values
- Cultural/background/religious effects
- Recently encouraged smaller family size (improvement in quality vs. quantity of having children)

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Fertility and Childbearing

Technology

- Birth control pills
- Healthier infants because of medical advances (means fewer live births needed)
- Disposable diapers, etc.

Retirement Decisions and Pensions

Effects of Retirement:

- Private savings
- Unemployment
- Size of labour force
- National income implications

Retirement Decisions and Pensions

- An area of increasing concern
- Retirement could imply:
 - leaving the labour force
 - reducing hours worked
 - moving to a less difficult job
- Impacts social policy
- Concerns of solvency of pension funds

Retirement Decisions and Pensions

Theoretical Determinants of Retirement:

- Mandatory retirement age
- Wealth and earnings
- Health and the nature of work and the family
- Public and private pension plans

Retirement Decisions and Pensions

Mandatory Retirement Age:

1. **Compulsory Retirement Age:**
Requires retirement at certain age but allows continuation of service usually on a year to year basis.
2. **Automatic Retirement Age:**
Requires retirement, no longer allowed to provide the service

Under the jurisdiction of the provinces.

Canada's Public and Private Pension

1. Universal Old Age Security Pension (OAS + GIS?)
2. Social Insurance: CPP/QPP
3. Employer-Sponsored Occupational Pension Plan
4. Other Arrangements:
Private savings, privately arranged pensions, RRSPs

Retirement Decisions and Pensions

Wealth and Earnings

- **Increase in Wealth:** Income effect, hence more leisure
- **Increase in Earnings:** Both income and substitution effects—the effect on leisure/retirement indeterminate

Health, the Nature of Work, and Family

- **Poorer Health:** Induces early retirement
- **Hard Physical Work:** Induces early retirement
- **Family:** Two vs. one income earner effect

Canada's Public and Private Pension

Universal Old Age Security Pension

- Financed by general tax revenue
- Demogrant or flat amount paid to all persons over age 65
- May be supplemented by means-tested "Guaranteed Income Supplement," based on need

Canada's Public and Private Pension

Social Insurance Pension: CPP/QPP

- Financed by compulsory employee and employer contributions
- Benefits related to contributions based on payroll tax applied to past earnings
- Universal participation

Formal Income-Leisure Model Application to Pension

$$Y_p = B + W(T - l) - pW(T - l) - tW(T - l), \text{ or}$$

$$Y_p = B + (1 - p - t)W(T - l)$$

Where:

Y_p = Income of a pension receiver

B = Pension

W = Wage rate

T = Time

l = leisure, thus $(T - l)$ = hours of work

p = payroll tax rate

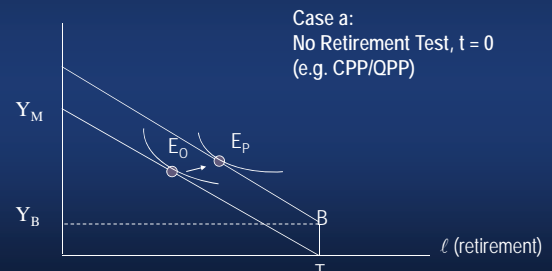
t = implicit tax (clawback)

Canada's Public and Private Pension

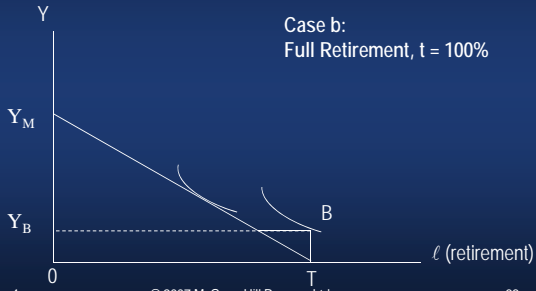
Employer-Sponsored Occupational Pension Plan

- Financed by employer, sometimes with employee contributions
- Benefits on type of plan:
 - Flat benefit plan
 - Earning-based benefit plan
 - Defined-contribution plan

Budget Constraint under Social Insurance Pensions (assume $p=0$)



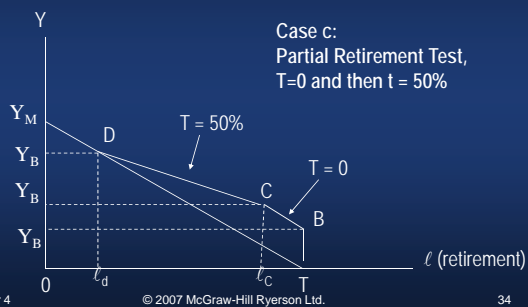
Budget Constraint under Social Insurance Pensions (assume $p=0$)



Other Provisions of Pension Plans

- Backloading
 - Early/special retirement provisions
 - Postponed retirement provisions
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Budget Constraint under Social Insurance Pensions (assume $p=0$)



Other Provisions of Pension Plans

Backloading

- Benefits get larger as seniority-based wage increases
 - Young workers have an incentive to stay with the firm
 - Older workers have an incentive not to retire too soon
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Other Provisions of Pension Plans

Early/special retirement provisions:

- Typically at age 55 with at least 10 years' service
- In most earning-based plans
- May be unsubsidized due to reduced number of years of service compared to the normal retirement age

Special Provisions:

Typically at age 60–62 with at least 20 years of service. Covers about 30% of earning based private pensions. Extensively subsidized.

Summary

- Systematic patterns of labour supply as individuals age
- Age-labour force participations of men vs. women
- Life-cycle model and intertemporal labour supply
 - Present value of life time income
 - Present value of life time consumption
- Household production and preferences
 - Non-market time
- Economics of family
- Retirement decision and labour supply

Other Provisions of Pension Plans

Postponed retirement provisions

- Typically involves pension penalties for postponing the retirement past the retirement age.

End of Chapter Four