Labor Supply: the Role of Human Capital and the Extensive Margin

Nada Wasi

Puey Ungphakorn Institute for Economic Research

Bank of Thailand

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➢ **Labor Supply: the Role of Human Capital and the Extensive Margin**

  (joint with Michael Keane, Economic Journal, 2016)

➢ **Modeling Life-Cycle Labor Supply in the Thai Labor Market**

  (joint with Warn N. Lekfuangfu, work-in-progress)

➢ Both are dynamic life-cycle models built from theory, key data patterns, and realistic economic environments (US and Thai contexts, respectively)

➢ Useful for simulating behavior responses to policy changes

Labor supply: the roles of human capital and the extensive margin

(joint with Michael Keane)

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➢ Focus on labor supply responses to tax changes

Important for designing optimal tax & transfer policies:

Labor supply elasticities	Optimal income tax rate for the top bracket
2.0	20-30%
1.0	33-50%
0.2	71-83%

sources : (Keane, JEL2011; Saez et al., JEL 2012)

➢ US context (Saez et al, JEL 2012):
"with some notable exceptions, the profession has settled on a value for this [labor supply] elasticity close to zero ..."

The notable exceptions: <u>either</u> incorporating human capital accumulation <u>or</u> extensive margin can generate larger elasticities.

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Marshallian labor supply elasticity (total elasticity)

- response of labor supply today based on today's wage rate

- combines (+) substitution effect   &   (-) income effect

(price of leisure ↑work more)   (richer, work less)

Hicks labor supply elasticity (compensated elasticity)

- only substitution effect (= Marshallian - income effect)

Frisch intertemporal elasticity of substitution

- changes in worker's labor supply over his life-cycle
  as his relative wages change

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Hours vs. Wages over the Life-Cycle (US Men):

Wage (after tax)

Hours

Age
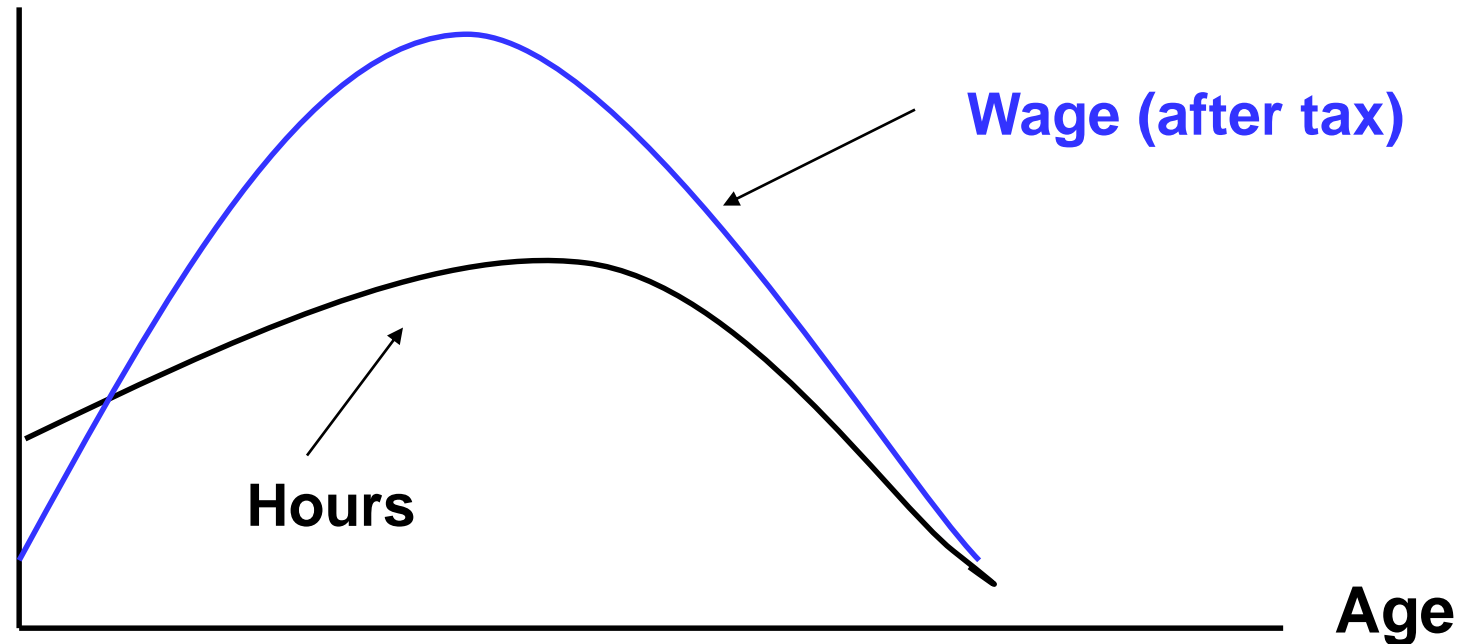
➢ This pattern + assuming exogenous wages→ the elasticity must be very small.

e.g., Frisch elasticity estimates: .15 (MaCurdy, 1981), .09 (Browning et al, 1985)

➢ No human capital effect :
   opp. cost of time (price of leisure) = relative real wage rates

➢ With human capital accumulation (learning-by-doing)

   work more today → higher future wage

   opp. cost of time = relative real wage rates
                              + opp. cost of future wage growth

                       large for young
                       small for old workers

                       →elasticities should grow with age

Extensive margin (work/not work) argument

➢ Most of earlier micro studies focus on employed prime-age men (intensive margin).

➢ Studies consider the extensive margin reporting larger elasticities
(e.g., Kimmel & Kneisner,1998; French, 2005; Rogerson and Wallenius, 2009)

Those close to be indifferent between working and not working are likely to be more
responsive to wage change.

The Young (low wages)

The Old (declining health and wages)

Married Women with Kids (high value of home production)

> A life-cycle model for males, integrating both human capital accumulation & the extensive margin features

> Decisions from school leaving age (16,18 or 22 for dropout, high school and college) until death (age T = 90 or 93)

At any age t, agent maximizes discounted expected utility from t to T by choosing

Consumption
Work Hours $\in$ [0, 500, 1000, 1500, 2000, 2500]
    Assume completely retire at age 75

Whether to apply for social security benefit
    Ages 62 to 74 only
    Must start to collect at 75

Key added dynamic features:

Work more this period

- accumulates human capital → faster wage growth

- leads to accrual of Social Security benefits when retire

Not work lowers the probability of having a job offer next period

Other features

➢ Fixed costs of work

➢ Part-time penalty

➢ Uncertainty in future wage

➢ Bequest

➢ A realistic specification of the US Social Security System

➢ Progressive taxes

➢ No borrowing constraints

➢ Unemployment benefits

➢ Simplified private pensions and health expenditure

At any t, agent maximizes discounted expected utility from t to T:

Value function at period t for a young worker with a job offer:

$$V(A_t, k_t, AIME_t)$$

$$= \max_{c_t, h_t}\{u(c_t, h_t) + \beta[\pi_t V_{t+1}(A_{t+1}, k_{t+1}, AIME_{t+1}) + (1 - \pi_t)\delta B(A_{t+1})]\}$$

asset

human capital

consumption

hours worked

prob. of living next period

bequest

AIME = Average Indexed Monthly Earnings

Within-period utility function:

$$u(c_t, h_t) = \frac{c_t^{a_1}}{a_1} - b\frac{h_t^{a_2}}{a_2}$$

$$a_1 < 1;\ a_2 > 1$$

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> Solve the finite-horizon problem by backward induction

State variables:

Assets, Human Capital,

Average Indexed Monthly Earnings , Lagged participation

Starting at 55: + Lagged pension

Starting at 62: + Lagged SS status, Age of Claiming SS

> For a given set of initial values and parameters, simulate agents' behaviors forward from leaving school age until death.

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Estimate the model by method of simulated moments:

➤ Eleven types of moments

average employment rate, average annual hours conditional on work

median full-time hourly wage

average consumption

% apply for Social Security benefits

standard deviation of hours, standard deviation of hours conditional on work

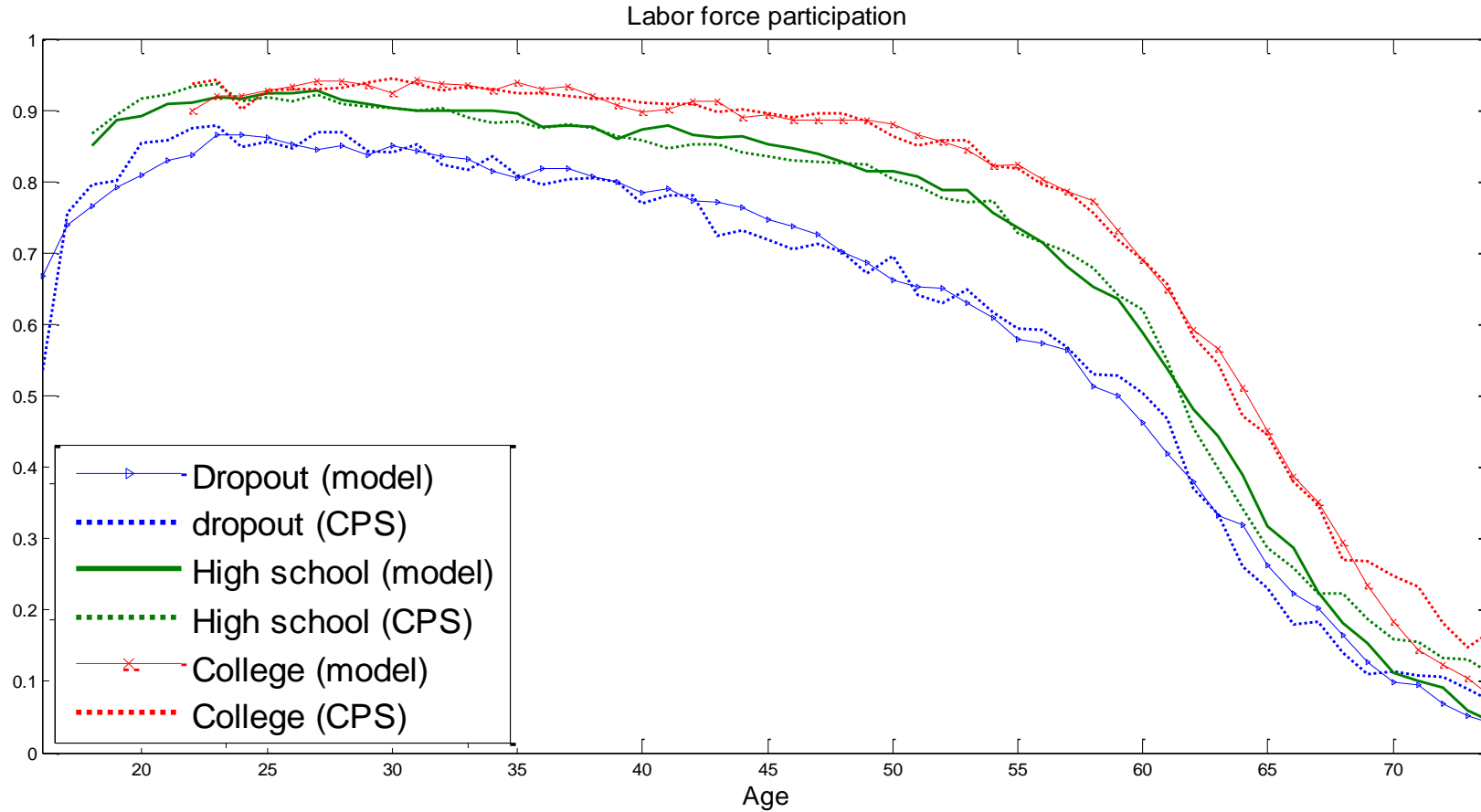standard deviation of log of hourly wage rate

prob of working conditional on working last year

prob of working conditional on not working last year
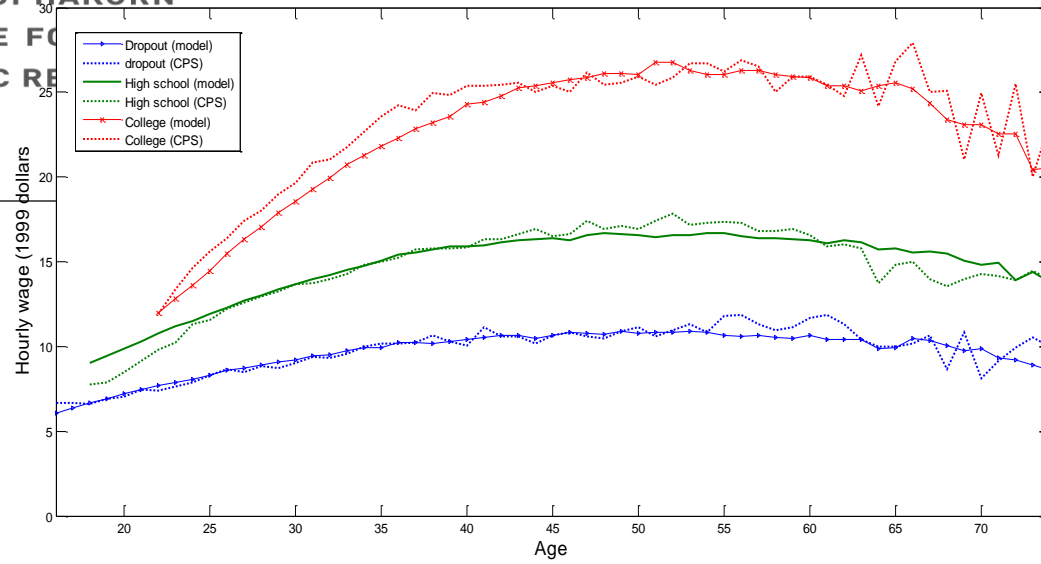
standard deviation of consumption

Data: US Current Pop. Survey (CPS), Consumer Expend. Survey (CEX)
Health and Retirement Study (HRS)

Labor force participation

Median full-time wage

Average consumption

Dropout (model)
dropout (CPS)
High school (model)
High school (CPS)
College (model)
College (CPS)

➤ Labor supply elasticities are not a constant that depends only on preference parameters.

The responses vary with age, education,

wage process (human capital accumulation),
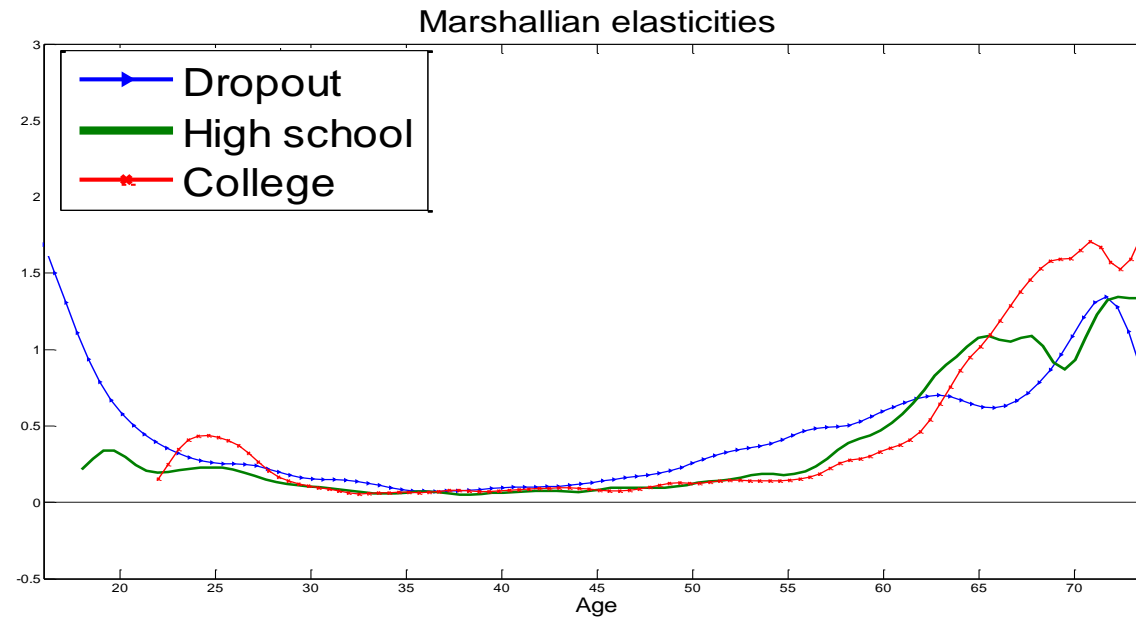
tax structure, and

whether a short-run or long-run is considered.

Elasticity estimates: Marshallian   .05 - 2.3

Hicks   .15 - 4.8

Frisch   .01 - 2.2
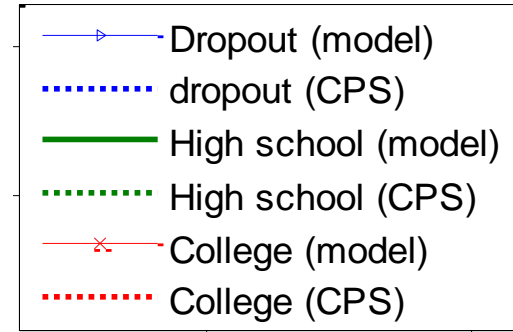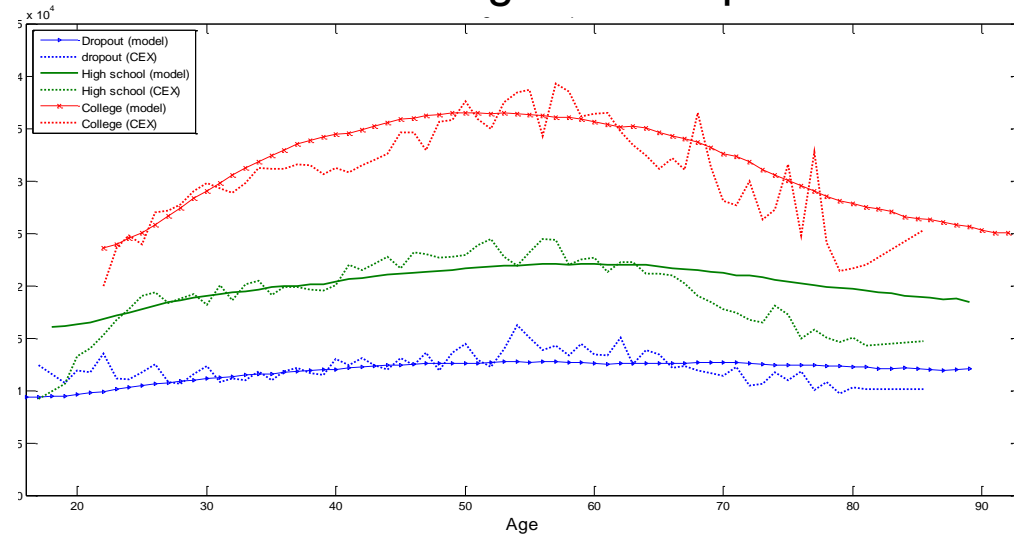
Key results from tax change experiments

Marshallian elasticities

Dropout : U-shape for Hicks and Marshalls elasticities (similar to extensive margin model prediction)

High school & college: elasticities grow with age   (similar to human capital model prediction)

➢ Intensive margin vs. extensive margin decomposition
      extensive margin is more important for less skilled, age 55+

➢ Tax experiment: a more progressive increase generates higher elasticities than a flat increase

➢ With human capital accumulation, permanent tax cut may have a larger effect than a transitory tax cut.

Modeling Life-Cycle Labor Supply in the Thai Labor Market

(joint with Warn N. Lekfuangfu)

a start of work-in-progress

➢ Attempt to understand how people make decisions about work, consumption and saving over their lives in the Thai context

➢ Key difference from the developed country model

   3 major sectors (informal, formal private, government)

   where an informal sector plays a big role.

➢ Start with a simple forward-looking dynamic life-cycle model for male workers

Work status of Thai male workers by age
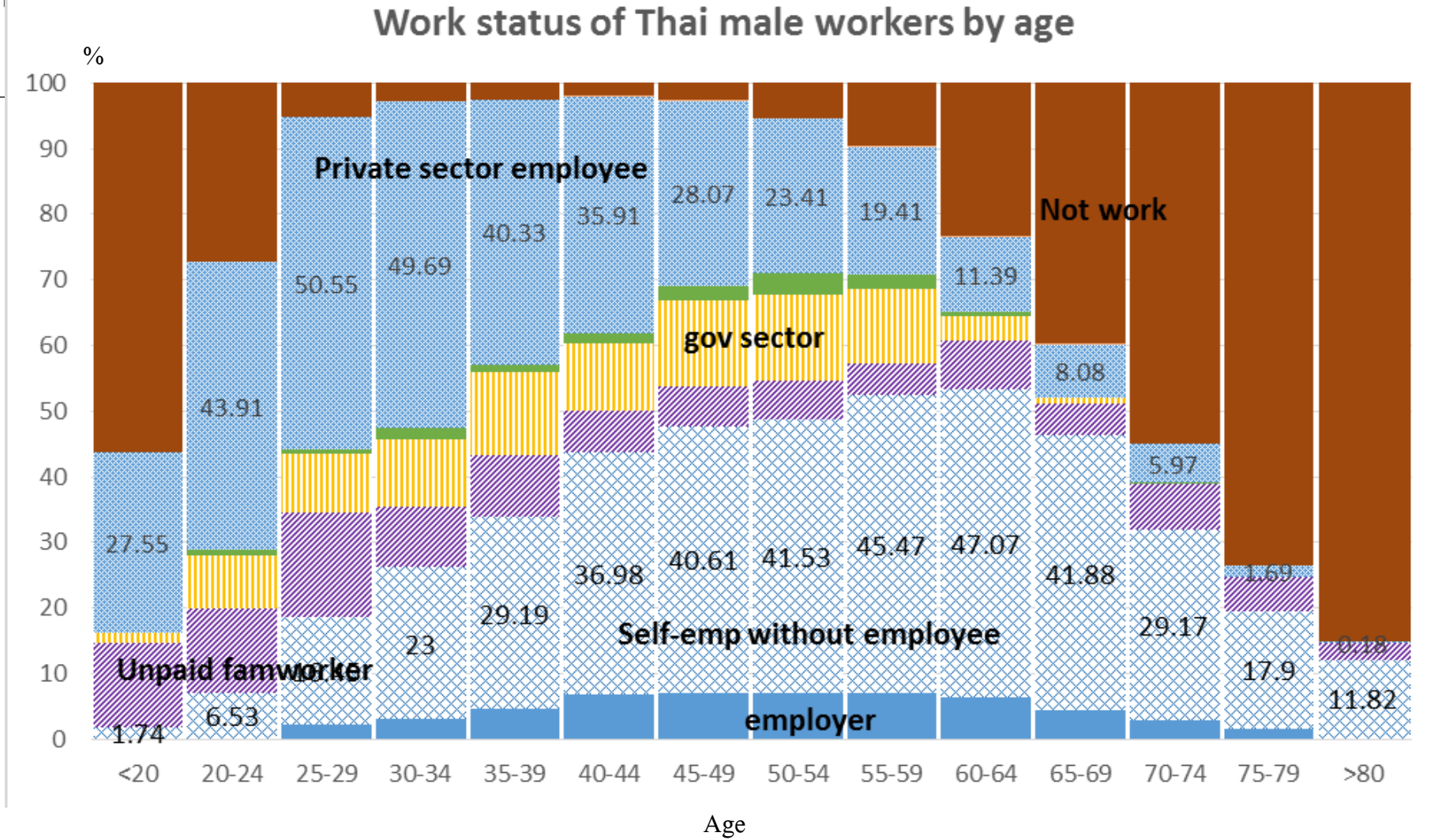
Source: pooled SES panel data 5 waves (2005-2012)

Shares of work status conditional on being a government worker last wave (males)

age	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
employer	0	0	0.16	0.99	0.95	0.55	0.24	0.39
self-emp without employee	1.39	1.65	1.63	4.37	3.83	4.17	8.3	10.85
unpaid fam worker	1.89	0.7	0.9	0.37	0.61	0.73	0.65	12.82
gov	83.64	84.62	88.67	86.41	88.04	87.61	81.77	34.52
private sector	8.73	6.78	6.2	4.82	4.4	2.57	0.8	0.97
not work	0.98	0.69	0.35	0.73	0.47	0.71	2.31	34.68

Source: pooled SES panel data 5 waves (2005-2012)

Shares of work status conditional on being a private sector employee last wave (males)

age	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
employer	0.55	0.46	1.55	1.07	1.97	1.23	1.54	0.88	3.03
self-emp without employee	6.56	10.46	13.55	16.52	15.49	19.81	19.1	19.37	14.73
unpaid fam worker	9.11	4.49	7.16	5.35	6.68	5.49	4.58	4.3	4.06
gov	2.22	1.36	1.76	1.8	1.94	2.44	0.99	0.91	0.32
private sector	76.55	79.62	72.75	71.09	68.8	61.35	60.45	60.7	44.75
not work	4.35	3.17	2.76	3.47	4.5	8.91	12.5	13.37	33.12

Source: pooled SES panel data 5 waves (2005-2012)

➢ Male workers, school leaving age until death

➢ Decisions: consumption,

   working sector (formal private, informal, government)
   hours worked (0, part-time, full-time, extra long)

Being in different sectors implies different:

   - wage distributions

   - social protections (unemployment, health insurance)

   - retirement resources (pension)

   - flexibility in working hours

   - options to later switch to a different sector

➢ What should be key mechanisms that draw people into different sectors (informal, formal private, gov) after leaving school and later in life?

      - skills, health

      - better wage offer (lucky draw) or expected wage path

      - preference (risk averse, want flexible work hours)

      - institutional factors (e.g., mandatory retirement age)

      - demand side factors

   Any other suggestion?

➢ The model can be used to simulate some interesting policy changes:

      - extend mandatory retirement age for government workers

      - change in the age that SS workers can claim retirement benefit

      - change in incentives to draw people to self-employment

      - change in labor income tax or relative wages

Any other suggestion?