Labour Supply Responses and the Extensive Margin: The US, UK and France

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January 2011

Extensive and Intensive Margins of Labor Supply

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  2. provide a detailed decomposition of the evolution of total hours of work into changes at the extensive and intensive margin
  3. recover elasticities at the intensive and extensive margin and explore the implications for measurement of aggregate hours elasticity

Fig 1.A Mean annual hours per individual aged 16 to 74

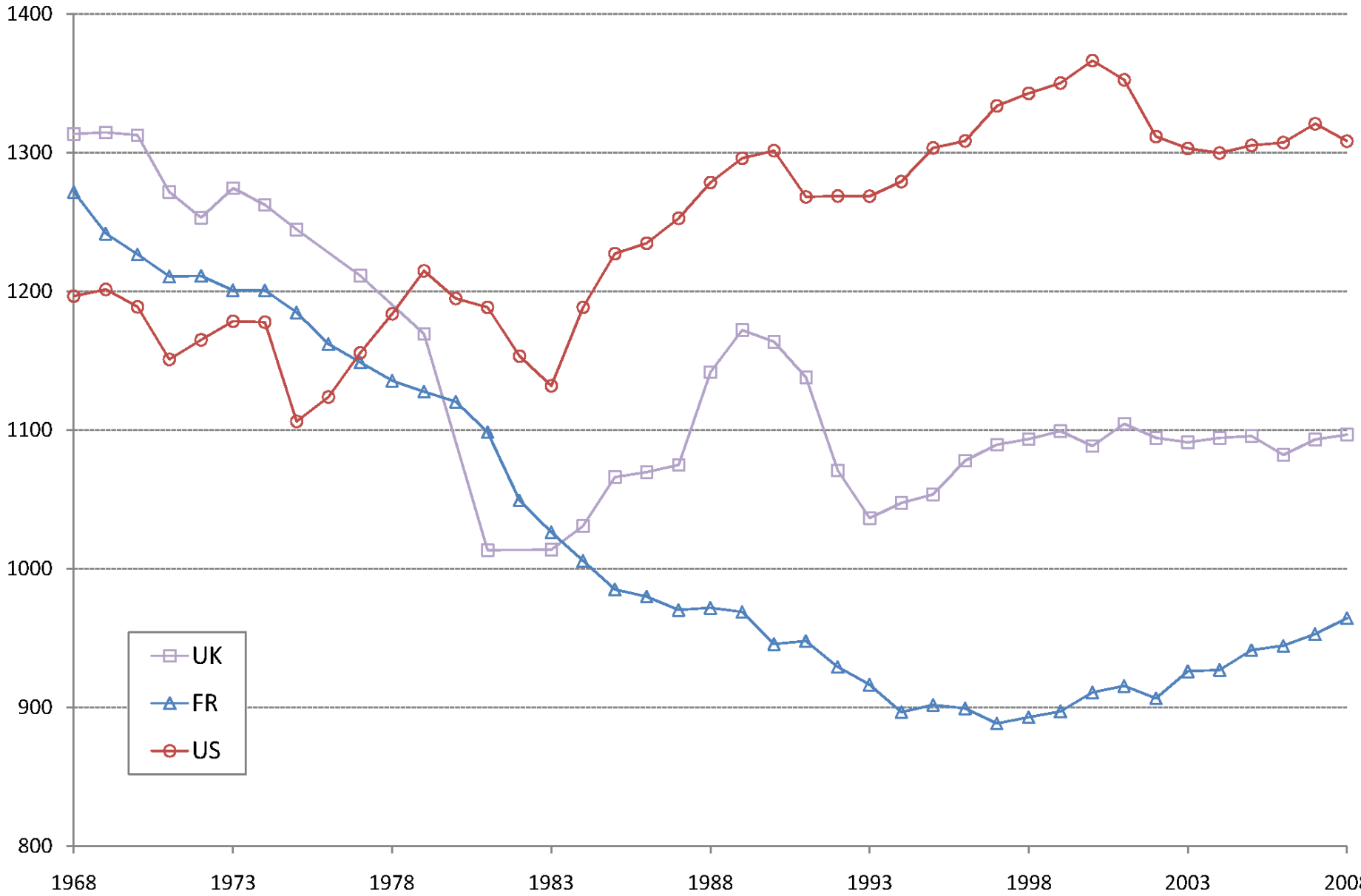


Fig 1.B. Employment rate (per population) aged 16 to 74

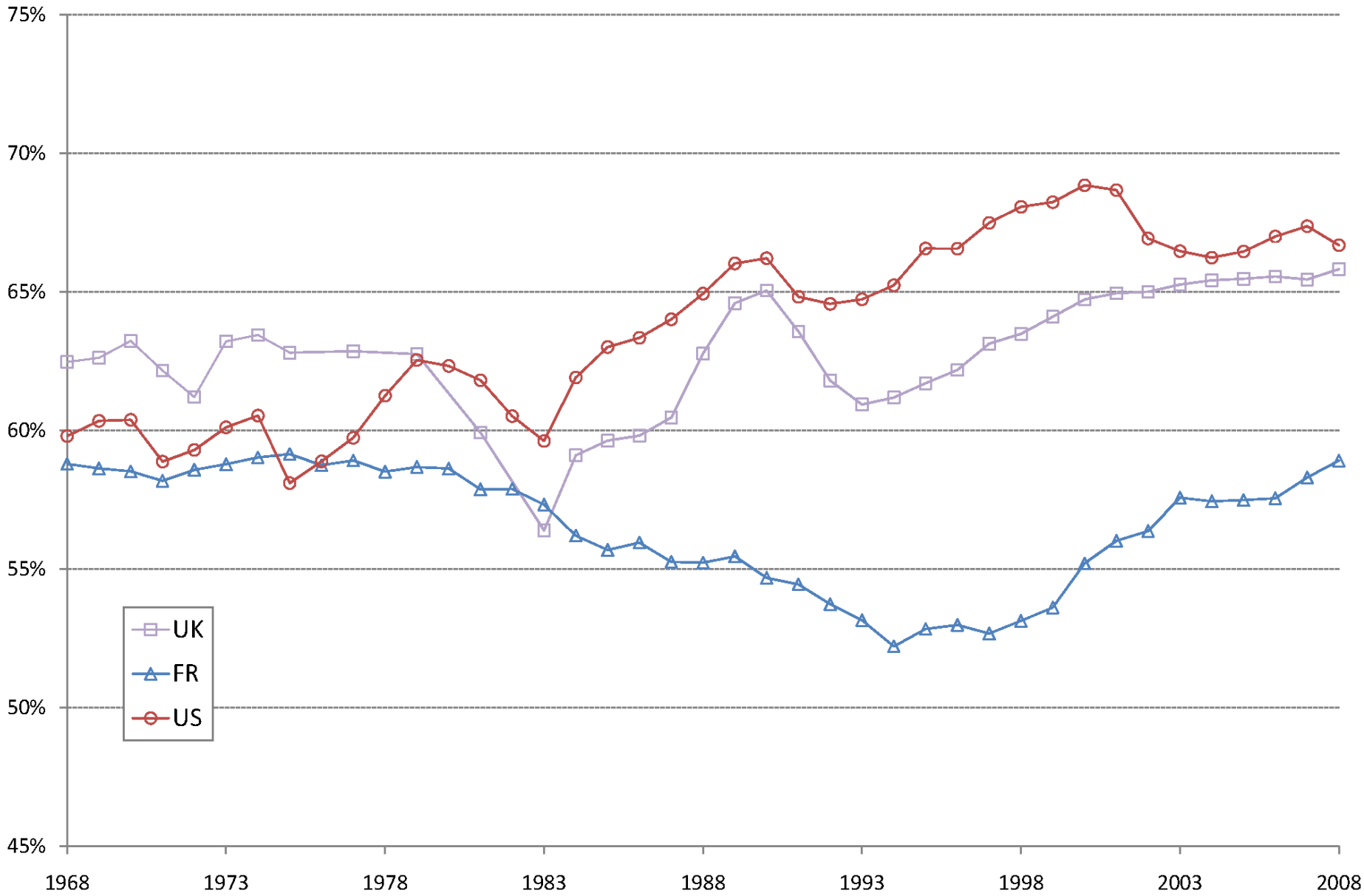


Fig 1.C. Mean annual hours per worker aged 16 to 74

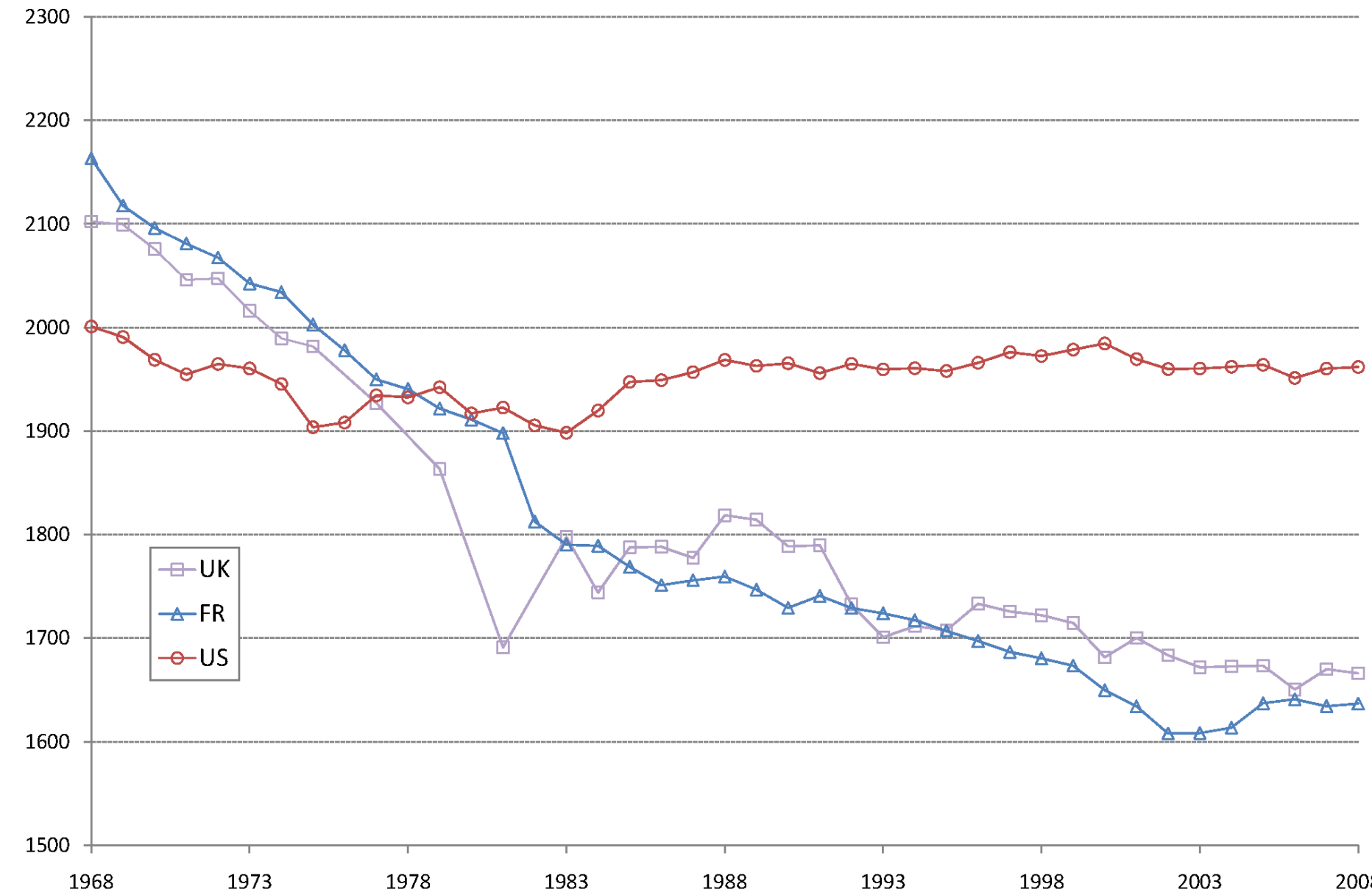


Fig 2.A. Male total hours by age 1977

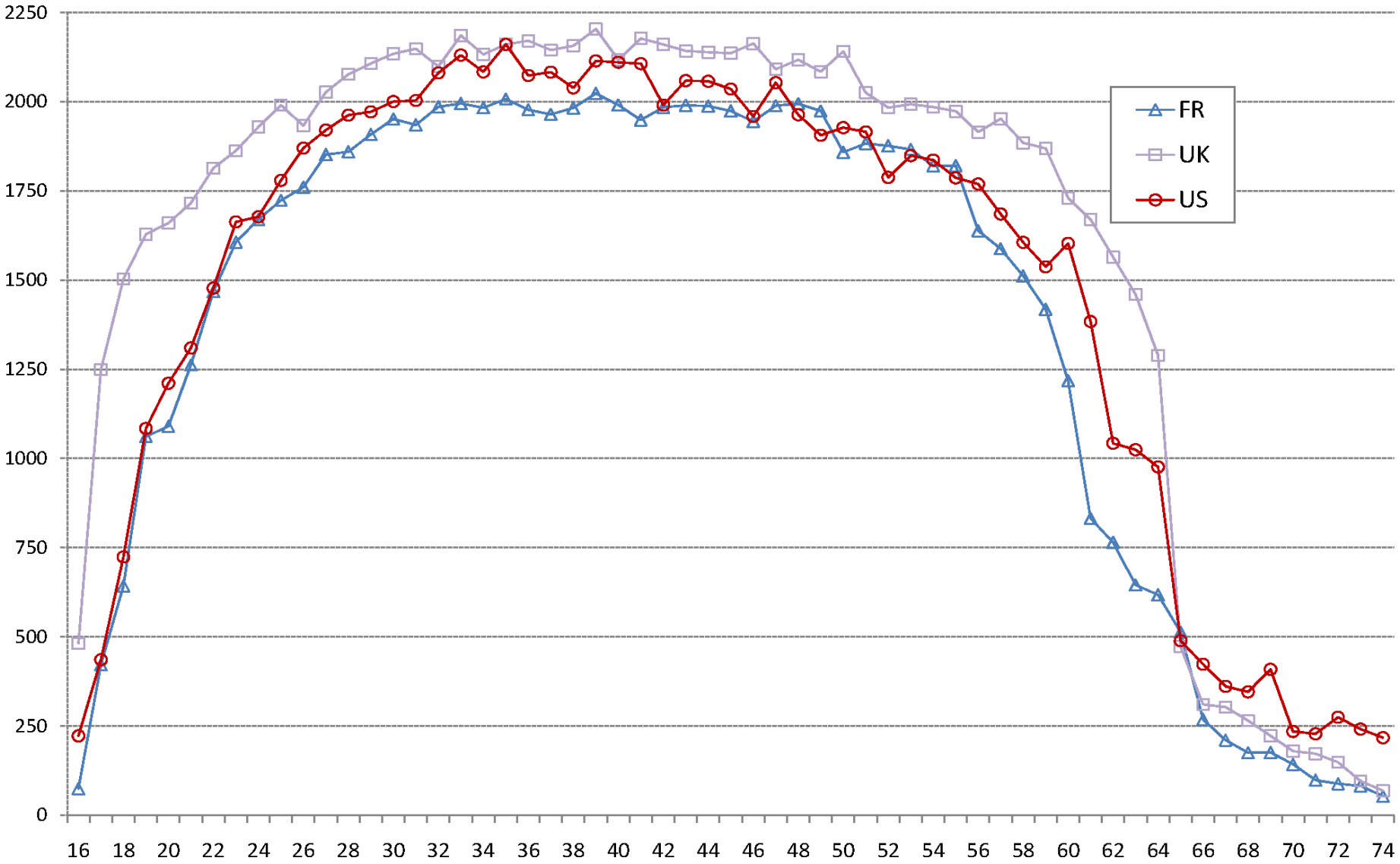


Fig 2.B. Male total hours by age 2007

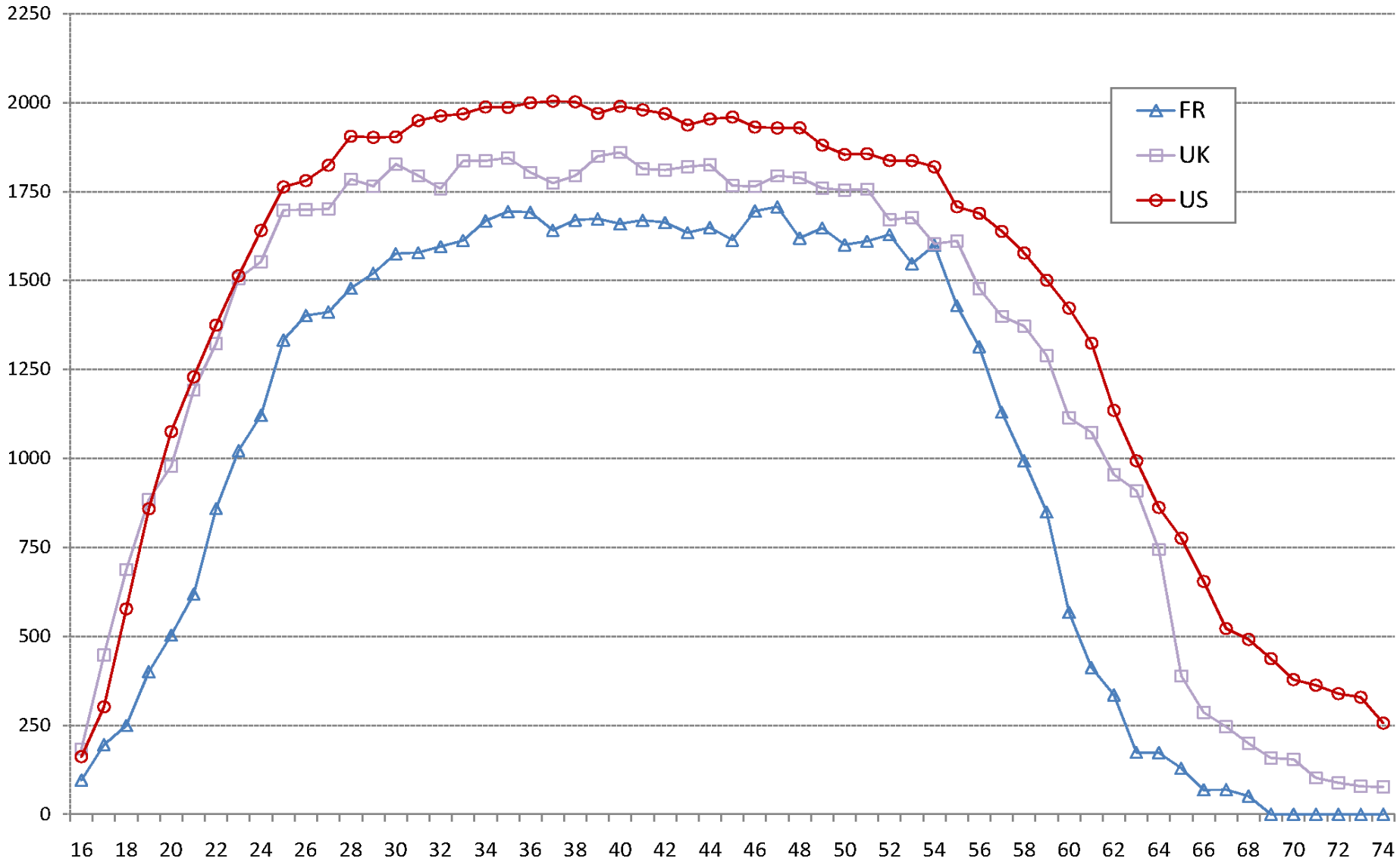
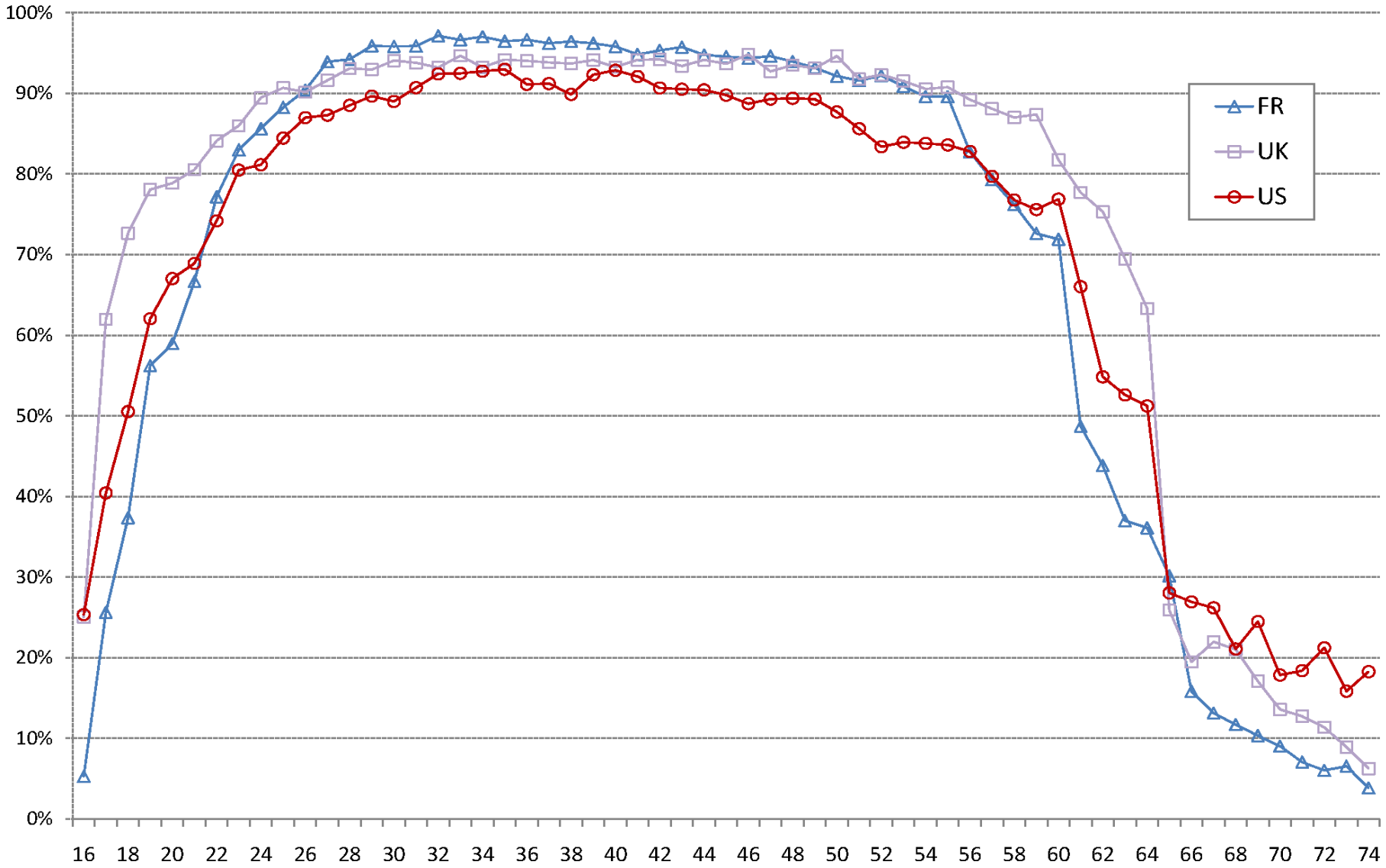


Fig 3.A. Male employment by age 1977



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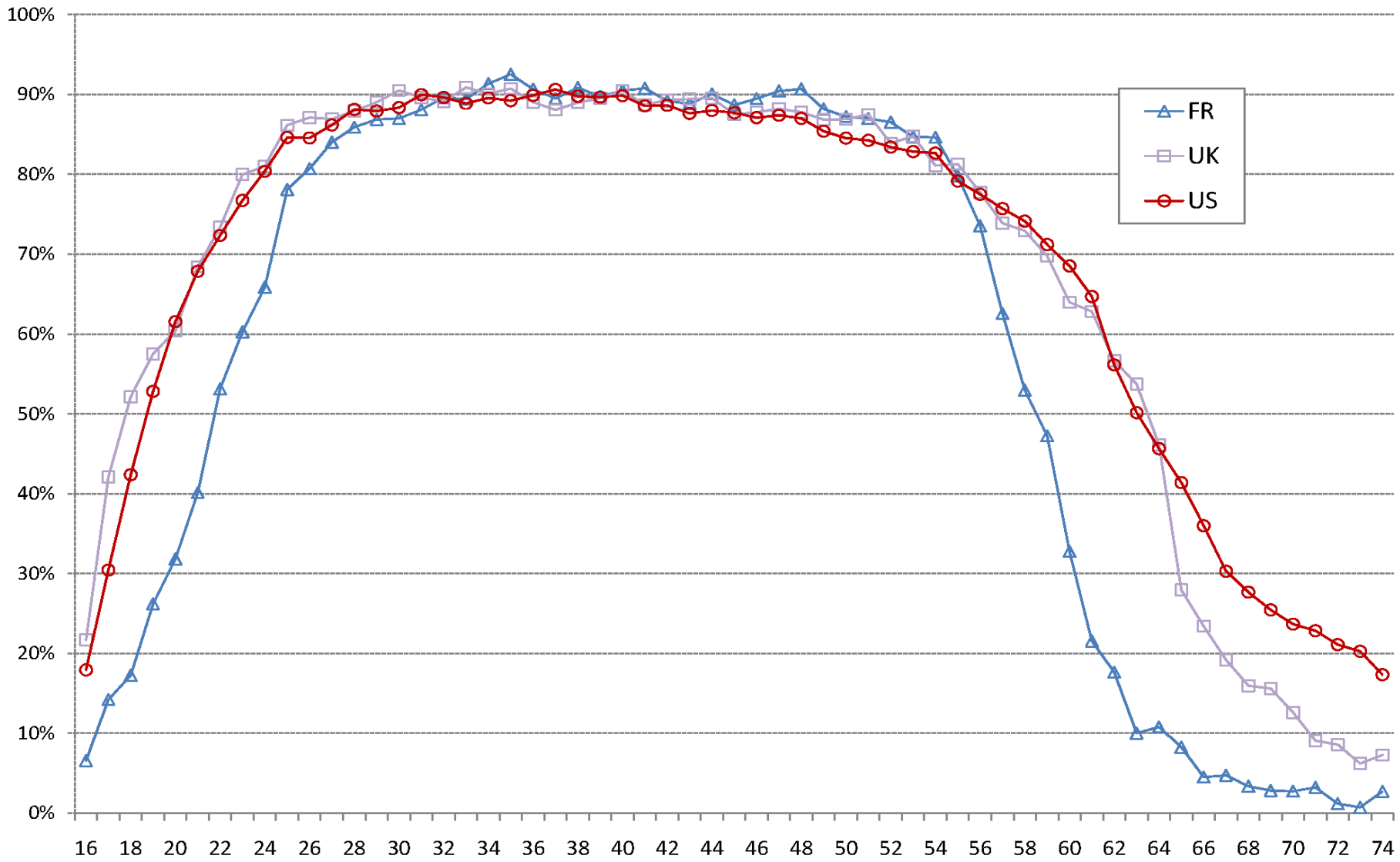
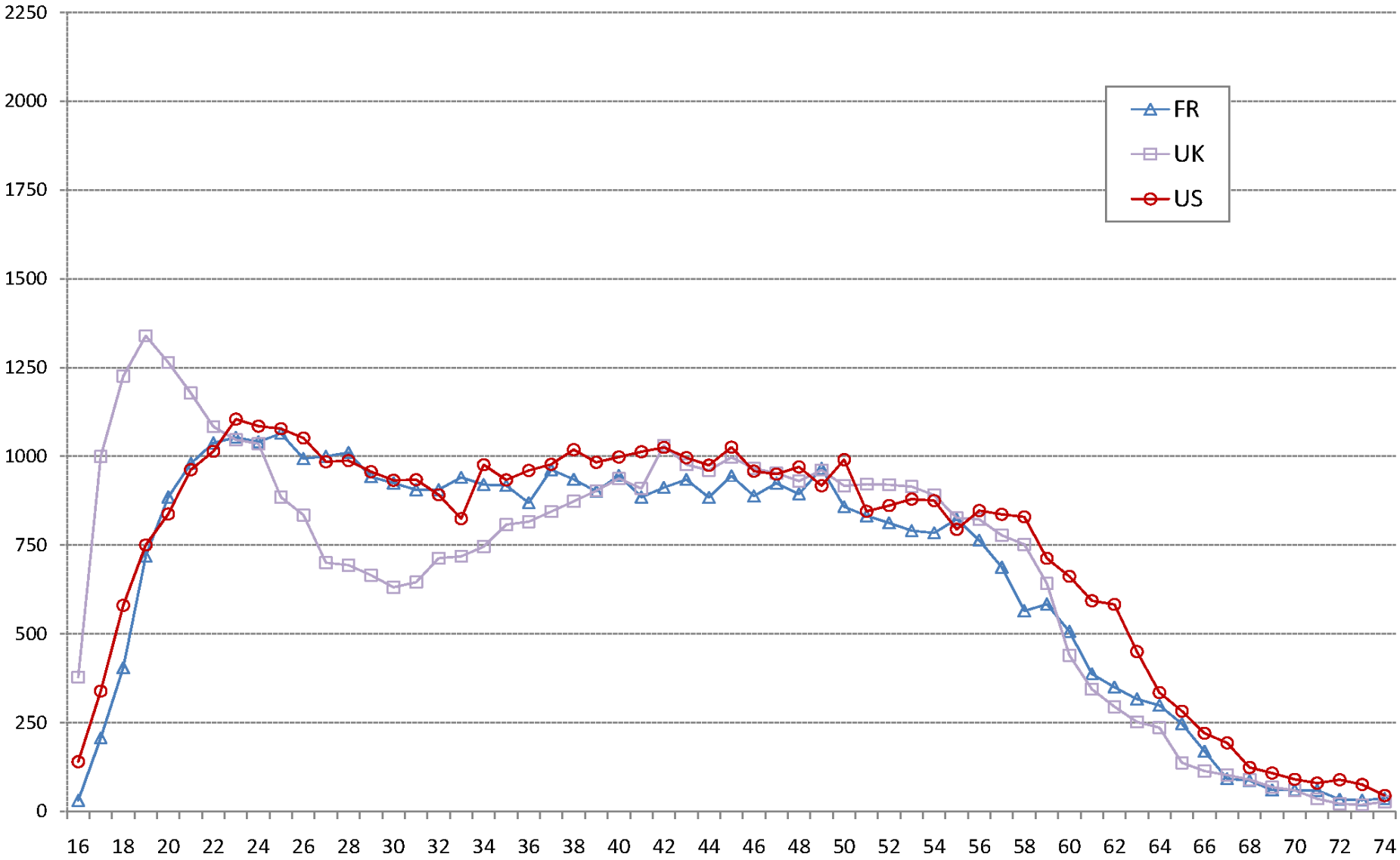


Fig 4.A. Female total hours by age 1977



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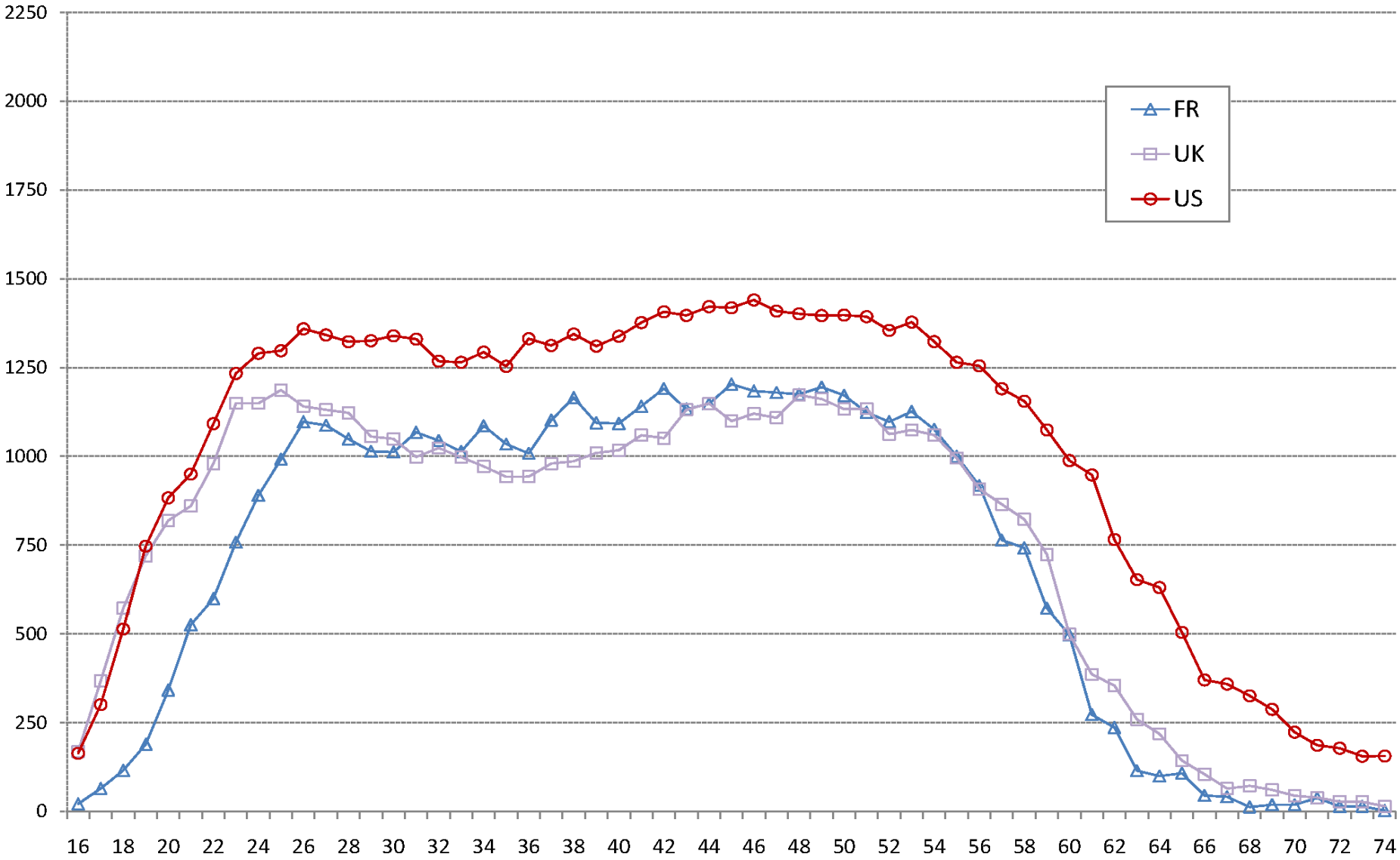

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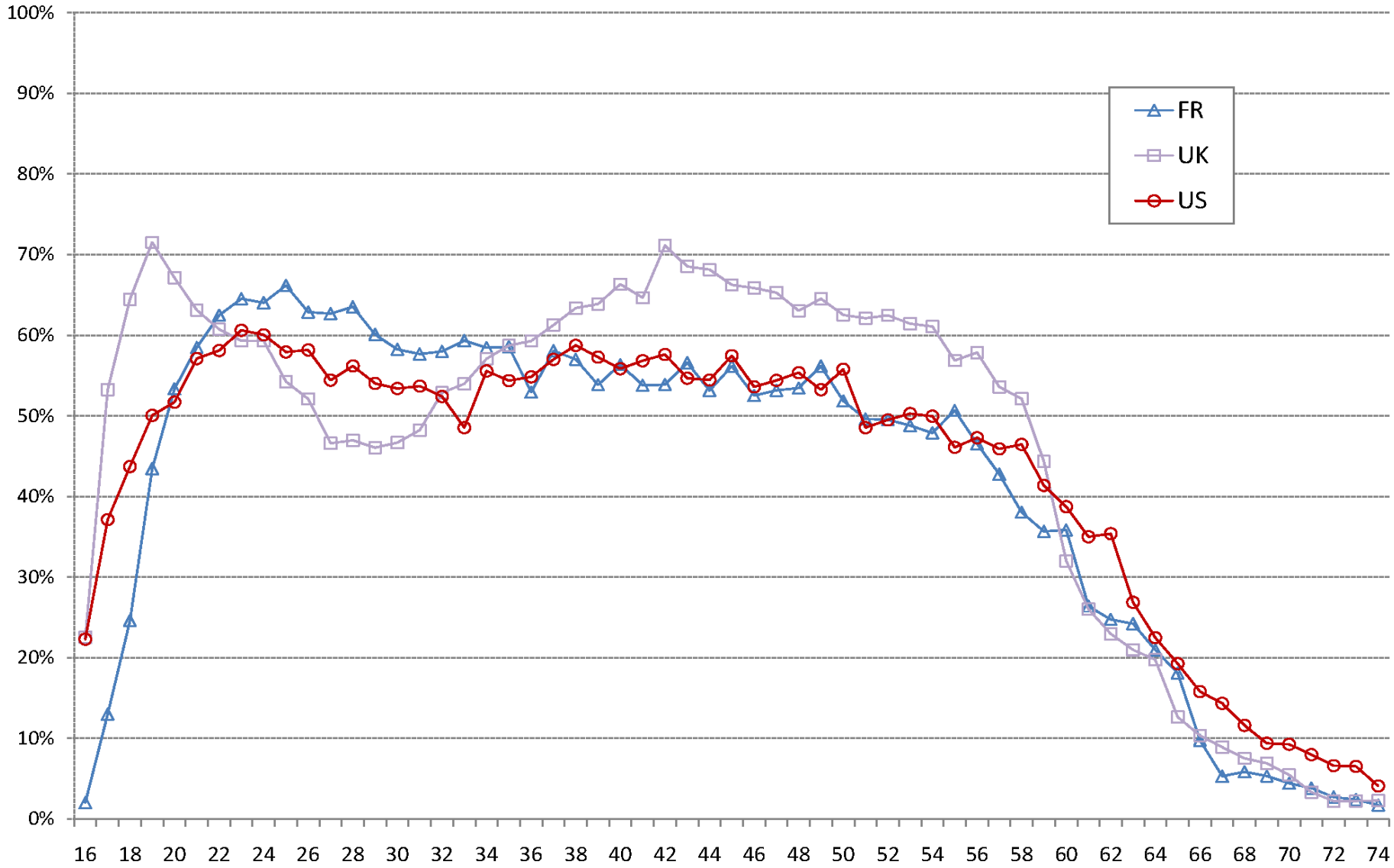

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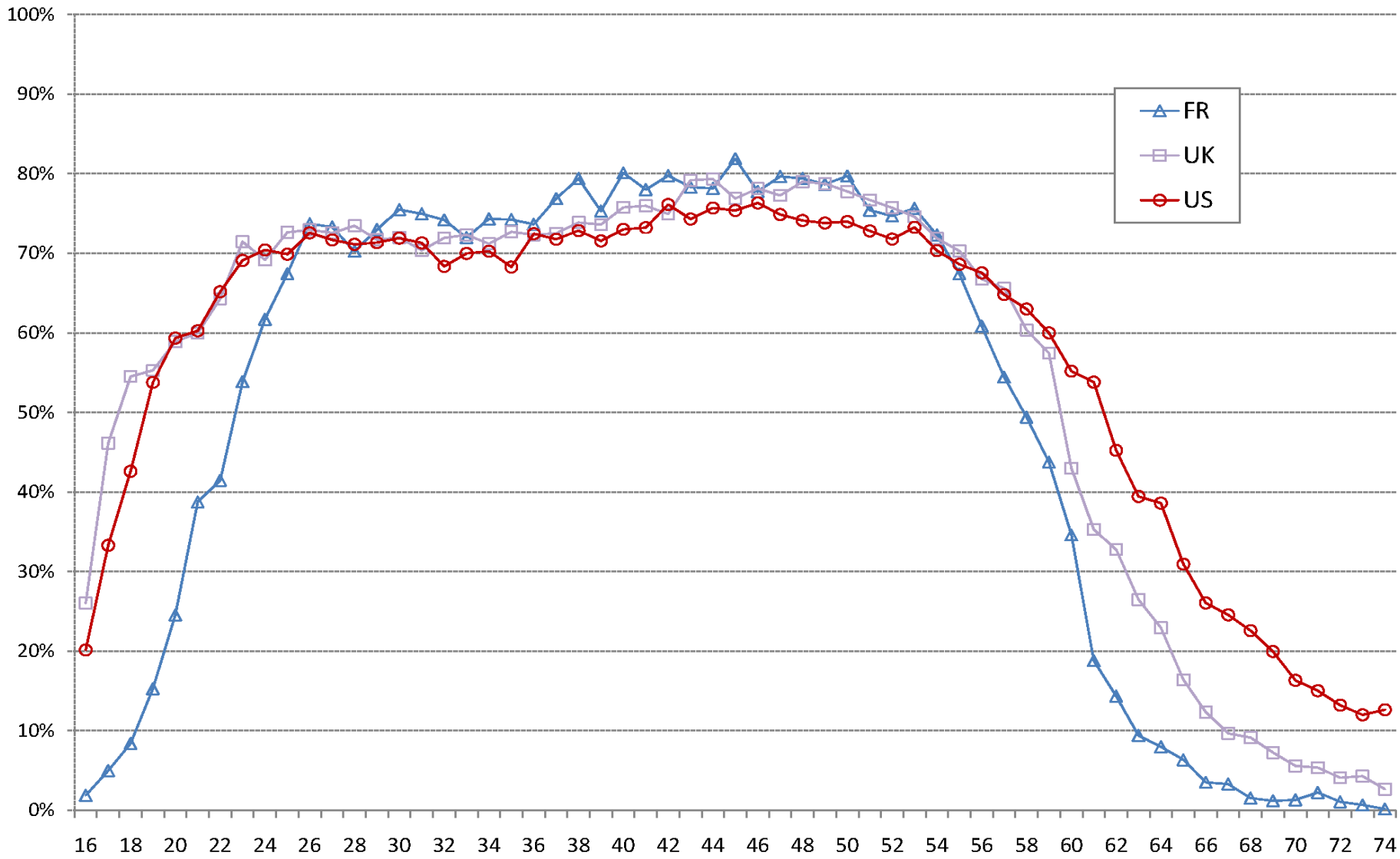

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– where each H_{jt} can be expressed as the product of hours per worker h_{jt} and participation in the labour market p_{j_t}

$$H_{jt} = p_{jt} h_{jt}.$$

Decomposing Changes in Hours Worked

We develop a simple decomposition:

- We measure the change due to the behavior of category j, holding the population structure constant as in date $t-1$, as in a Laspeyres index

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  - where S_t measures the change in the composition of the population:

$$S_t = \sum_{j=1}^{J} H_{jt}[q_{jt} - q_{j,t-1}].$$

Table 1 Decomposing the change in total hours, 1977-2007

	Year	Youth (16-29)		Prime aged (30-54)		Old (55-74)	
		Men	Women	Men	Women	Men	Women
FR	1977	1402	871	2010	951	827	367
	2007	858	627	1639	1116	508	344
	Δ_j	-82	-38	-82	36	-36	-3
UK	1977	1707	938	2117	873	1107	323
	2007	1219	876	1786	1055	790	385
	Δ_j	-71	-9	-70	39	-42	10
US	1977	1344	835	2018	947	1025	447
	2007	1236	956	1922	1373	1084	754
	Δ_j	-19	22	-19	90	6	38

SOURCES: Enquête Emploi, Labour Force Survey, Census Population Survey.

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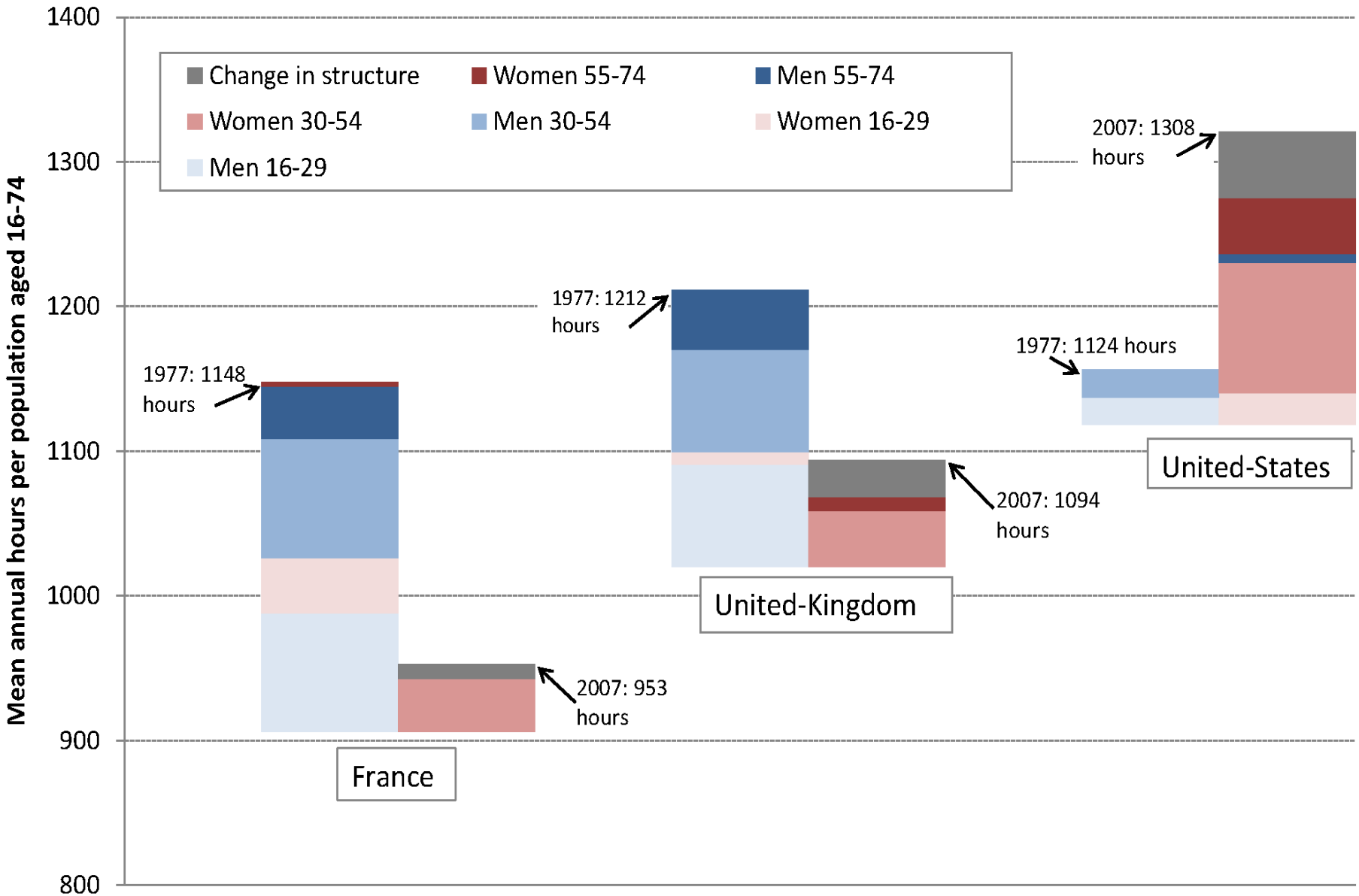
- composition S: +10 for FR, +25 for UK, +46 for US, see Figure 6..

Fig 6. Decomposing the change in total hours (1977-2007)



Bounding Changes at the Extensive and Intensive Margins

- We decompose the change in total hours for the j type Δ_j, into the sum of an an intensive component $I_j = p_{Ij}\Delta h_j$ and an extensive component $E_j = h_{Ej}\Delta p_j$.

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- Assuming the fraction p_{Ij} is in the interval $[p_{j,t-1}, p_{jt}]$, we get the intensive bounds:

I_j belongs to the interval $[p_{j,t-1}(h_{jt} - h_{j,t-1}), p_{j,t}(h_{jt} - h_{j,t-1})]$.

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- From the identity $\Delta_{jt} = I_j + E_j$, the extensive bounds are given by

$$E_j \text{ belongs to the interval } [h_{j,t-1}(p_{jt} - p_{j,t-1}), h_{j,t}(p_{jt} - p_{j,t-1})].$$

Bounding Changes at the Extensive and Intensive Margins

- At the limits, the change in total hours for any type j satisfies two polar exact statistical decompositions:

$$\Delta_{jt} = q_{j,t-1}\left\{[h_{jt} - h_{jt-1}]p_{jt} + [p_{jt} - p_{jt-1}]h_{j_{t-1}}\right\} \tag{1}$$

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– the second term is the extensive margin (Laspeyres in (1), Paasche in (2)).

Table 2. Decomposing the changes at the extensive and intensive margins by age and gender (1977-2007)

	Year	Men 16-29	Women 16-29	Men 30-54	Women 30-54	Men 55-74	Women 55-74
FR	I-P, I-L	[-37,-28]	[-23, -19]	[-59, -56]	[-49, -35]	[-11, -8]	[-10, -9]
	E-L, E-P	[-54, -45]	[-19, -16]	[-27, -23]	[71, 85]	[-28, -25]	[6, 7]
	Δ	-82	-38	-82	36	-36	-3
UK	I-P, I-L	[-42, -36]	[-26, -23]	[-48, -45]	[-3, -2]	[-22, -19]	[-8, -6]
	E-L, E-P	[-35, -29]	[14, 17]	[-25, -22]	[41, 41]	[-23, -20]	[15, 17]
	Δ	-71	-9	-70	39	-42	10
US	I-P, I-L	[-6, -6]	[1, 1]	[-5, -5]	[14, 19]	[3, 3]	[3, 5]
	E-L, E-P	[-13, -13]	[21, 21]	[-14, -14]	[72, 77]	[3, 3]	[33, 35]
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The Distribution of Elasticities

- Finally, link up these changes at the extensive and intensive margins to movements in the distribution of taxes, relative wages, demographics and other incomes.
  - draw implications for the aggregate hours elasticity.

Aggregation and the Distribution of Elasticities

- Consider preferences

$$U = \begin{cases} \lambda R(h) + \dfrac{(T-h)^{1-1/\alpha}}{1-1/\alpha} - \beta & \text{if } h > 0 \\ \lambda s & \text{if } h = 0 \end{cases}$$

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$$\varepsilon = \frac{1}{\tilde{H}} \int_w \int_\alpha \int_\lambda p()h()[\varepsilon_I(\alpha,\lambda,w) + \varepsilon_E(\alpha,\lambda,w)]g(\alpha,\lambda,w)d\alpha d\lambda dw.$$

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  – $h(\alpha,\lambda,w)$ hours, $p(\alpha,\lambda,w)$ proportion of type (α,λ,w) workers

Estimating the Distribution of Elasticities

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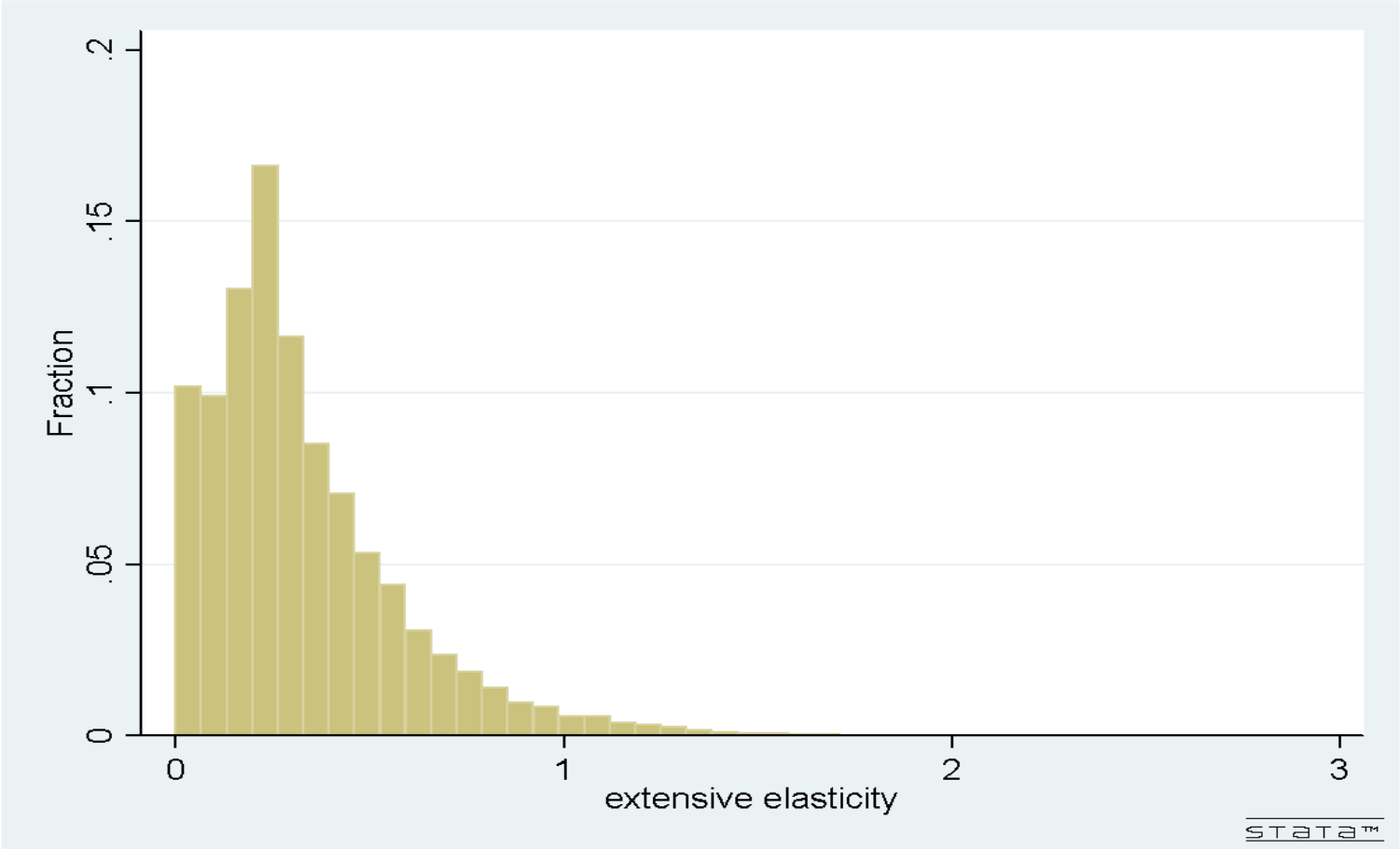
  - there have been distinct changes in participation tax rates and effective marginal tax rates over this period, see Mirrlees Review (IFS, 2010).
  - recover Marshallian elasticities for within period utilities - Frisch elasticities can also estimated using the consumption data.

Fig 8.A Empirical distribution of extensive elasticities: UK men and women, age 30-54



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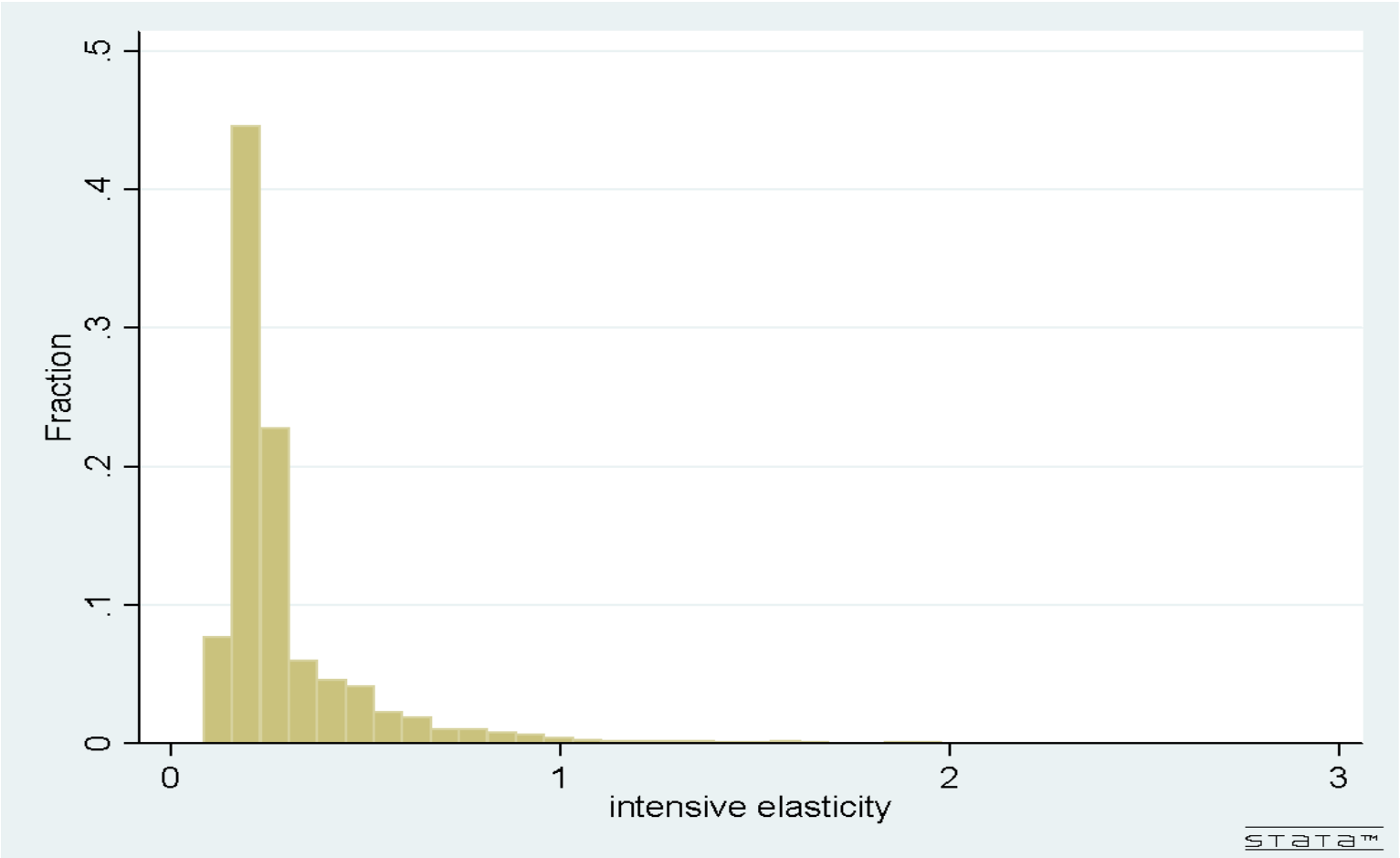

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  - median *intensive* elasticity ranges between .09 and .23. Hicksian and Frisch are larger.
  - *aggregate* hours elasticity lies in the range .3 to .44 (using the empirical distribution of the wages and estimated unobserved heterogeneity).

Summary

- We have proposed a systematic way of decomposing the importance of the extensive and the intensive margins of life-cycle labour supply in explaining the overall movements in aggregate hours of work.

Summary

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