AEI/NPC, Jan. 29, 2002

Pharmaceutical Consumption and Mortality, Morbidity in the OECD Countries

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Ongoing Research, extending earlier published work:

Frech, H.E., III and Richard D. Miller, Jr. *The Productivity of Health Care and Pharmaceuticals: An International Comparison*, Washington, D.C.: AEI Press (1999).

Miller, Richard D., Jr and H.E. Frech III (2000). "Is There a Link Between Pharmaceutical Consumption and Improved Health in OECD Countries?" *PharmacoEconomics*, 18 (Sup. 1): 33-45.

Research Grants: early work, Sciences Po de Paris, current work, group of pharmaceutical companies

Early literature

- Health care doesn't matter in rich countries
    - Conventional wisdom in health economics (flat-of-the-curve medicine)
    - Explains the emphasis on cost control in health economics and health policy
- Only one early study separated pharmaceutical from other health care consumption (Akira Babazona and Alan Hillman 1994)
    - Found pharmaceuticals to be ineffective
    - But, very flawed study
        - E.g., pharmaceutical prices, hence consumption, badly mismeasured

Recent studies, including some by Frank Lichtenberg, much more positive

Our earlier study

- OECD, across countries
- Measured health by life expectancy at birth, 40 and 60, at 1993
  - Measured pharmaceutical prices by pharmaceutical-specific exchange rate
    - Best possible, but still crude
  - Pattern of pharmaceutical consumption across countries surprising
    - US not a high pharmaceutical consumption – less than half of France

Table 1: 1985 Pharmaceutical Consumption, OECD, in 1990 US Dollars

Rank	Country	Pharm Consumption
1	**France**	**$560.927**
2	Italy	448.060
3	Germany	374.138
4	Luxembourg	348.086
5	Belgium	304.466
6	Spain	286.618
7	Canada	262.609
8	Iceland	248.776
9	**United States**	**236.000**
10	Sweden	225.859
11	Norway	216.341
12	Greece	216.032
13	Australia	197.590
14	New Zealand	194.828
15	Austria	191.940
16	Finland	190.418
17	Switzerland	188.095
18	United Kingdom	183.721
19	Portugal	152.193
20	Netherlands	130.189
21	Ireland	120.482
22	Denmark	112.846
23	Turkey	61.818

Findings of our earlier study

- Pharmaceuticals surprisingly productive, especially for older people
- At 40, doubling of pharmaceutical consumption raises life expectancy by 2 percent
- At 60, by 4 percent
  - On average, this is about

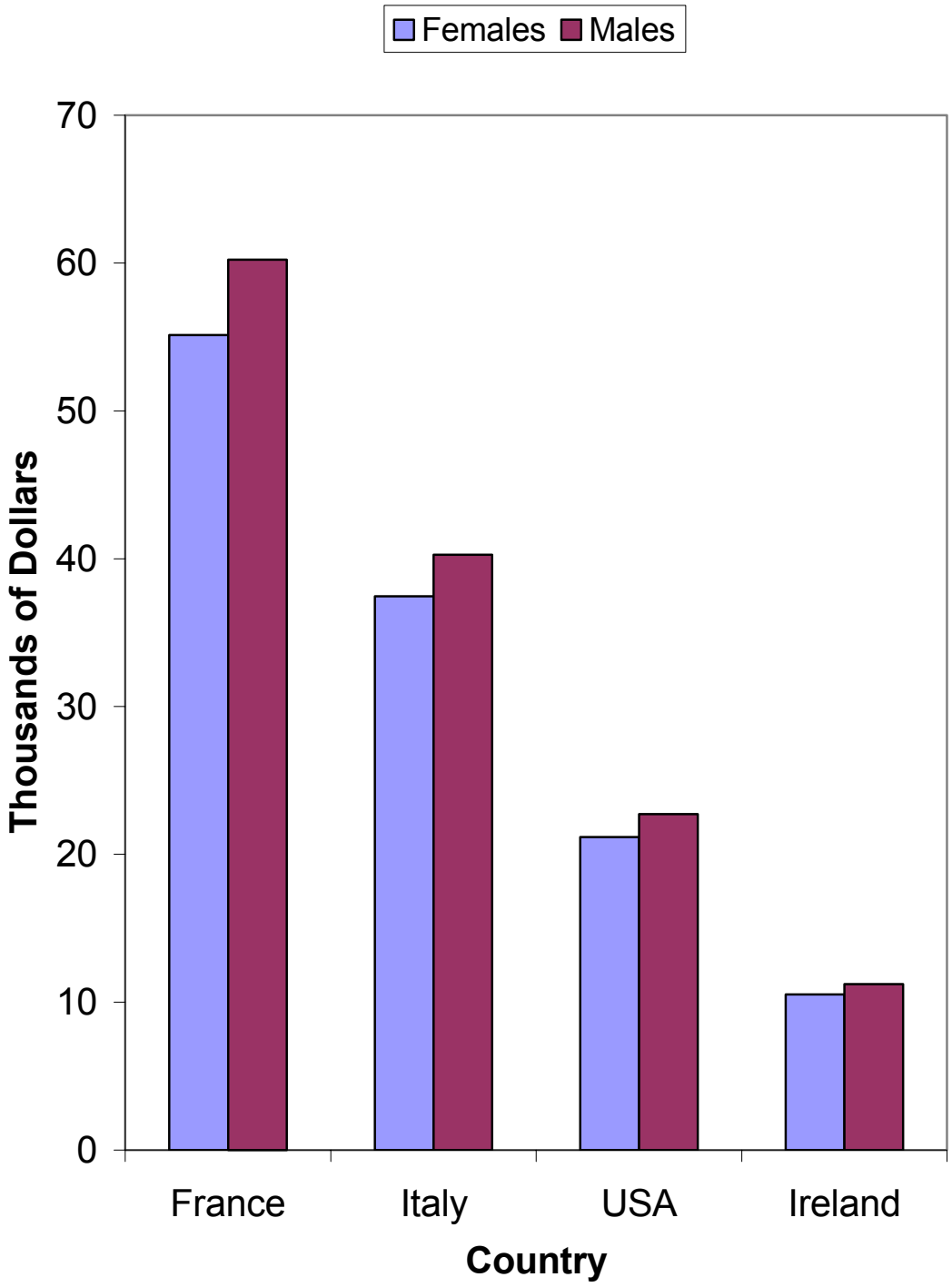
    8 months for men

    12 months for women
- Effects vary greatly across countries, because of diminishing returns
  - Countries with high pharmaceutical consumption already have less to gain
    - Expressed as dollars per life year, See Table and Graph

Table 2: The Lifetime Cost of Extending Life by One Year at Ages 40 and 60 for Females, In 1990 US Dollars

Country	Age 40	Age 60
USA	**$21,165**	**$16,607**
France	**55,127**	**42,081**
Australia	21,358	16,591
Austria	17,936	14,198
Belgium	33,293	26,147
Canada	17,670	13,545
Denmark	17,406	14,020
Finland	18,826	15,061
Germany	36,303	28,853
Greece	24,486	19,500
Ireland	10,527	8,578
Italy	37,462	29,333
Netherlands	14,884	11,806
New Zealand	28,917	22,807
Norway	21,160	16,691
Portugal	20,400	16,431
Spain	23,662	18,409
Sweden	23,539	18,410
Switzerland	19,171	14,746
Turkey	3,515	3,043
UK	17,890	14,367

Figure 1: Lifetime Cost of a Life Year at age 40, in 1990 Dollars



Statistical Notes

- Controls for
  - Other (non-pharmaceutical) health care
  - GDP per capita
    - Limited ability to untangle these two statistically
  - Lifestyle (animal fat consumption, alcohol and tobacco)
- Statistically significant at 90 percent level for effects at age 40, at 95 percent level at age 60

- Sensitivity analysis: robust to many changes
  - Dropping Turkey
  - Dropping non-European countries
  - Dropping lifestyle variables
  - Adding percent over 65
  - Adding unemployment
  - Adding education
- Differences from Babazona and Hillman?
  - We use correct pharmaceutical exchange rate, they use average exchange rate over the whole economy
  - We allow for diminishing returns, they force a linear, constant productivity relationship

Limitations

- Crude measure of health
  - Missing quality of life
  - Aggregating all health conditions
- Animal fat consumption variable
  - Real target is habits of overeating and sedentary lifestyle, that result in obesity

New study extends older work

- More recent data (1994-99 v. 1993 for health measures, 1990 v. 1985 for pharmaceuticals)
- Quality of life
  - Disability-Adjusted Life Expectancy (DALE, from the WHO Global Burden of Disease Project)
- Cause of death
  - Premature Mortality
    - Potential Years of Life Lost up to 70, (PYLL) (OECD)
  - Age-specific mortality by cause (WHO)
  - Three causes: circulatory disease, cancer, respiratory disease
- Lifestyle: obesity in place of fat consumption
  - Note, US is worst offender (US men four times Sweden)

Findings

- Life expectancy and quality of life
  - Replicate original work on life expectancy
    - Larger effect of pharmaceutical consumption
      - Doubling leads to 6 percent longer life expectancy at 60.
        - This is about

          14 months for men

          17 months for women
    - Statistically significant at better than the 99 percent level

Quality of life

- Pharmaceuticals more powerful for quality of life
  - At 60, doubling of pharmaceutical consumption raises DALE by 9 percent
    - About 50 percent larger than new results on life expectancy
    - On average, this is about

      17 months for men

      20 months for women
      - Again, varies greatly across countries
        - Dollars per DALE is about half the level of the earlier graph
          - Roughly

            $25,000 for France

            $10,000 for the US

- Obesity is powerful; more harmful to quality of life
    - Doubling obesity (from 10 percent to 20 percent of the population) decreases the DALE at 60 by about 5 percent
        - This sounds extreme, but
            - Huge variation across countries
            - Doubling obesity (from 10 percent to 20 percent) corresponds roughly to giving Austria the obesity levels of the US

- Cause of death
    - Potential years of life lost (PYLL)
        - Note: potential life is only 70 years. So, effects on older people are missed
        - Age-specific mortality (65-74 and 75+)
            - Picks up effects on older people
- Lots of variation across disease classes
    - Biggest effects on circulatory disease
        - Smaller, and mostly in 54-74 age group, for cancer and respiratory disease

- Causes of death, in detail
  - Circulatory disease, pharmaceuticals have major effect on PYLL and age-specific mortality
  - Doubling would reduce
    - PYLL by 19 percent
    - Mortality 65-74 by 36 percent
    - Mortality 75+ by 15 percent
- Cancer
  - Doubling would
    - Statistically insignificant, wrong sign, effect on PYLL
    - Reduce mortality by about 11 percent at ages 65-74 and 75+ (Statistically significant at 90 and 95 percent levels)

- Respiratory disease
  - Doubling would
    - Statistically insignificant, wrong sign effect on PYLL
    - Reduce mortality by 34 percent at age 65-74 (Statistically significant at 99 percent)
    - Statistically insignificant, reduce mortality by 15 percent at age 75+
- Summary of disease-specific effects
  - Big at all ages for circulatory disease
  - Smaller and focused on older consumers for cancer and respiratory disease

- Lifestyle
    - Obesity generally very harmful, especially up age 75
    - Smoking very harmful for respiratory disease

Conclusions

- Early results are confirmed: Pharmaceutical consumption increases life expectancy
- Extensions
    - Quality of life--even stronger
        - Pharmaceutical consumption increases the quality of life roughly

            $25,000 per DALE in France

            $10,000 per DALE in US
    - Disease classes
        - Circulatory disease, large, all ages
        - Cancer and respiratory disease, smaller, concentrated in older people

- Policy implications
    - "Flat-of-the-curve" argument too strong
    - Pharmaceuticals are productive
    - Caution in restricting pharmaceutical use by regulation