

# International Comparison of Physician Incomes: Online Appendix

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# A Data Appendix

## A.1 Data construction

The underlying data source for each country is administrative tax records. We link these tax records to occupation codes or health care professional registers to identify physicians, and then calculate physicians’ locations in their country’s national income distribution. For the top five percentiles, we express this information using the share of physicians in each percentile. For the rest of the income distribution, we report the share of physicians that fall within a percentile range. Percentiles are defined using the floor; for example, percentile “99” means physicians at or above the 99th percentile cutoff of the national income distribution, and “98” means physicians between the 98th percentile cutoff and the 99th percentile cutoff. We exclude physicians with negative incomes from our sample. Table A.1 below summarizes the data and the definitions that follow.

### A.1.1 United States

The U.S. data are obtained from the Census Bureau, which links physicians’ tax records to their National Provider Identification (NPI) numbers.<sup>1</sup> We observe approximately 820,000 physicians in 2017. We use the income tax data and definition of physicians as in Gottlieb et al. (2025). We categorize physicians into specialty groups including primary care, surgical specialties, medical subspecialties, anesthesiology, radiology, obstetrics and gynecology, neurology, hospital-based physicians, and procedural specialties. These specialty groups are aggregates of Medicare specialty codes defined by the Centers for Medicare & Medicaid Services. See Appendix Table E.1 of Gottlieb et al. (2025) for a crosswalk.

Our primary income measure when reporting relative position in the income distribution is adjusted gross income (AGI). AGI is measured at the household level, whereas our income measures for other countries are measured at the individual level. We therefore supplement these data with individual total income (`inctot`) from the American Community Survey IPUMS (Ruggles et al., 2025). We pool 1-year estimates for 2015–2019 to measure incomes with greater precision. Physicians are identified using 1990 IPUMS occupation codes.

Gottlieb et al. (2025) show that physicians substantially underreport business income. Section A.4 describes how we adjust for this under-reporting.

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<sup>1</sup>A physician is in our sample if they appeared in the NPI registry in 2018 or had an NPI number that was deactivated prior to 2018. This technically includes physicians who stopped practicing medicine and changed to a different career. Empirically, this matters little: Gottlieb et al. (2025) show in Appendix Table E.3 that among NPI-holders who were surveyed in the 2017 American Community Survey, individual total income is very similar for physicians classified as “doctors” using ACS occupation codes compared to individuals who reported a non-physician occupation code.

### A.1.2 Canada

The Canadian data are from approximately 100,000 physicians in the 2016 Canadian Census. Incomes are measured using tax records linked to the survey responses, and are from 2015. Our income measure is individual total income plus net capital gains and losses. Physicians are identified using occupation codes from the 2016 National Occupation Classification. We use these codes to separately categorize physicians as primary care doctors (“General practitioners and family physicians”) or specialists (“Specialist physicians”).

### A.1.3 Sweden

The Swedish data cover approximately 55,000 physicians from the LISA (Longitudinal Integration Database for Health Insurance and Labor Market Studies) database. Income measures are from linked tax records. We define “physician” as individuals in the LISA register with a physician occupation code in at least one calendar year during 2005–2017. This is defined as SSYK96 4-digit code “2221” during 2005–2013 and SSYK12 3-digit code “221” during 2014–2017.

The Swedish system for training physicians consists of three stages: (a) medical school (5.5–6 years); (b) general clinical training in the healthcare sector (allmäntjänstgöring, AT; minimum 18 months); and (c) specialist training (specialisttjänstgöring, ST; five years). Completion of stages (a) and (b) qualifies an individual to work as a licensed medical doctor. This is our definition of “all physicians” in the Swedish data. Completion of stage (c), which is typically hospital-based and includes formal examinations, is required to practice as a specialist. Physicians undergoing training in stages (b) and (c) are classified as “other doctors.”

Income is measured in Swedish kronor, and we compute positions relative to the Swedish income distribution. Our primary income measure of Sweden is total pretax taxable income (including capital income surplus), which includes wages, salaries, and self-employment. In section B.3, we report additional results excluding capital income from the Swedish income measure.

### A.1.4 Netherlands

The Dutch data cover approximately 70,000 physicians drawn from the universe of the Dutch population. Data are from the Professions in Individual Healthcare (Dutch acronym BIG) register, individual tax records, and the Personal Records Database (BRP). We observe detailed specialty categories including primary care, surgical specialties, medical subspecialties, anesthesiology, radiology, obstetrics and gynecology, neurology, hospital-based physicians,

and procedural specialties. These are the same broad specialty groups which we use to group U.S. physicians. We also observe junior doctors—doctors who have completed medical school, but never complete a residency—whom we exclude from our primary specialist comparisons. Some small cells (10 or fewer physicians) were censored for privacy reasons. When computing total counts, we assume these censored cells have 5 observations each.

Dutch income is measured using Personal Gross Income. This measure includes wages, salaries, and self-employment income, but does not include capital income.

## **A.2 Institutional context**

Table [A.2](#) provides a background summary of key facts about each country’s healthcare institutions. These data are from the OECD and other publicly available sources, for the most recent year available.

Table A.1: Summary Statistics

|                           | United States                                            |                            | Canada                                                    | Netherlands                                                      | Sweden                                                      |
|---------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------|
| Income level              | Household                                                | Individual                 | Individual                                                | Individual                                                       | Individual                                                  |
| Mean income (All)         | \$562,100                                                | \$458,100                  | \$194,700                                                 | \$185,700                                                        | \$115,200                                                   |
| Number of physicians      | 819,500                                                  |                            | 100,660                                                   | 70,295                                                           | 55,097                                                      |
| Mean income (PCPs)        | \$499,800                                                | \$282,300                  | \$164,600                                                 | \$181,900                                                        | \$75,400                                                    |
| Number of PCPs            | 314,000                                                  |                            | 56,710                                                    | 37,182                                                           | 18,657                                                      |
| Mean income (Specialists) | \$818,700                                                | \$526,500                  | \$233,400                                                 | \$186,700                                                        | \$140,600                                                   |
| Number of Specialists     | 332,254                                                  |                            | 43,960                                                    | 30,547                                                           | 28,650                                                      |
| Data year                 | 2017                                                     |                            | 2015                                                      | 2017                                                             | 2017                                                        |
| Data source               | IRS tax data<br>Form 1040                                |                            | Canadian Census<br>with linked<br>tax records             | Personal Records<br>Database (BRP) with<br>linked tax records    | LISA Database<br>with linked<br>tax records                 |
| Income measure            | adjusted gross<br>income (AGI)                           | individual total<br>income | wage and salary,<br>self-employment,<br>and capital gains | wage and salary,<br>and self-employment                          | wage and salary,<br>self-employment,<br>and capital gains   |
| Physician definition      | National Provider<br>Identifier (NPI)<br>Registry (2018) |                            | National Occupation<br>Classification (2016)              | BIG (Professions in<br>Individual Healthcare)<br>online register | Swedish Standard<br>Classification<br>of Occupations (SSYK) |

*Notes:* This table summarizes the data on physician incomes in the United States, Canada, the Netherlands, and Sweden. Data sources and income definitions are specified in the table for each country. In column 2, “Individual total income” refers to the primary income measure in Gottlieb et al. (2025). Income mean is computed for physicians age 20 to 70, with the exception of U.S. specialists, where incomes are measured for physicians age 40-55. Income is reported in 2025 USD and adjusted for purchasing power parity. Disclosure Review Board approval no. CBDRB-FY23-0319.

Table A.2: Background characteristics on countries

|            |                                          | United States                                                      | Canada                                                            | Netherlands                                                                   | Sweden                                            |
|------------|------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------|
| National   | Physicians per 1,000 people              | 2.72                                                               | 2.81                                                              | 3.94                                                                          | 2.93                                              |
| Statistics | Share physicians specializing            | 0.45                                                               | 0.44                                                              | 0.43                                                                          | 0.26                                              |
|            | Healthcare expenditures per capita       | \$13,659                                                           | \$6,871                                                           | \$6,367                                                                       | \$6,528                                           |
|            | Public share of expenditures             | 0.39                                                               | 0.70                                                              | 0.85                                                                          | 0.86                                              |
|            | GDP per capita                           | \$87,937                                                           | \$67,086                                                          | \$86,310                                                                      | \$72,792                                          |
| Physician  | Years of medical school                  | 4                                                                  | 3-4                                                               | 6                                                                             | 5.5-6                                             |
| Training   | Years of residency                       | 4-7                                                                | 2-7                                                               | 4-6                                                                           | 5                                                 |
|            | 4-year degree before medical school      | Yes                                                                | Yes                                                               | No                                                                            | No                                                |
|            | Average cost of medical school (\$1,000) | \$263                                                              | \$49                                                              | \$18                                                                          | \$0                                               |
| Employment | Employment arrangements                  | Employed by hospitals, systems, corporate groups; private practice | Independent contractors billing public plans; some salaried roles | GPs mostly self-employed; Specialists are salaried or contract with hospitals | Salaried employees of regional health authorities |

*Notes:* This table presents background information on the physicians and healthcare systems of the U.S., Canada, the Netherlands, and Sweden. Physicians per capita is for 2022 and is taken from the OECD Health Statistics website. Share of physicians specializing comes from our disclosed administrative data for the U.S., Canada, and the Netherlands. Sweden defines “specialist” more broadly than other countries, so we use data from Socialstyrelsen (the Swedish National Board of Health and Welfare) to calculate the share of specialist using a definition more similar to the U.S. (for example, excluding family practice physicians and pediatricians from the “specialist” category). This data source covers the same universe of physicians as our Swedish administrative data, and the total specialist counts are similar. Per-capita health expenditures are from the 2022 Global Health Expenditure Database (in 2025 USD). Share of total health expenditures from public sources are from the Centers for Medicare and Medicaid Services, the Canadian Medical Association, and the European Observatory on Health Systems and Policies. Data on training requirements are from Gottlieb et al. (2025) for the U.S., the Canadian Post-MD Education Registry and Canadian Medical Association for Canada, Kroneman et al. (2016), Kringos et al. (2015), and Federatie Medisch Specialisten (the Federation of Medical Specialists) for the Netherlands, and Sveriges Läkarsällskap (the Swedish Medical Association) for Sweden. GDP per capita estimates are from the World Bank International Comparison Program (ICP), in 2025 USD. Data on tuition costs for medical school from The Association of American Medical Colleges (AAMC), The Association of Faculties of Medicine of Canada (AFMC), and Maastricht University. For Sweden tuition is 0 for EU residents (though non-EU residents pay tuition). We take the average annual cost by country, convert to 2025 USD, and multiply by years of training (4 years for the U.S. and Canada, and 6 for the Netherlands). Disclosure Review Board approval no. CBDRB-FY2020-CES005-035, CBDRB-FY21-009, CBDRB-FY2021-CES010-015, CBDRB-FY2021-CES010-01, and CBDRB-FY23-0319.

### A.3 Calculating U.S. physician shares in the bottom percentiles

To ensure compliance with disclosure restrictions, we use data for 50 kernel density points and a linear interpolation to compute the share of physicians in each percentile of the U.S. AGI distribution. We use publicly available percentile cutoffs from the IRS.

We use the same kernel density based interpolation to compute mean AGI values within each percentile.

### A.4 Adjusting IPUMS individual total income for underreporting

Gottlieb et al. (2025) report average incomes for the subset of physicians surveyed in the 2017 ACS. Average individual total income is \$478,200 using IRS data, and \$337,800 using ACS data. The age restriction is the same as this paper (20–70) and the underlying data sources are similar (the only difference is that Gottlieb et al. (2025) use the 2017 restricted-use ACS, whereas we use pooled 2015–2019 IPUMS 1-year estimates). We scale IPUMS individual total income (`inctot`) to account for underreporting of business income. We scale by the ratio of IRS to ACS estimates, 1.42, applied in proportion to the ratio of business income to `inctot` within each percentile of the (unadjusted) `inctot` distribution.<sup>2</sup> Our method scales up incomes in higher percentiles of the income distribution more than in lower percentiles, reflecting the fact that higher-earning physicians have a larger share of income from business income, and thus underreport a larger share of their overall income.

Let  $y_i$  denote the income of physician  $i$ . Let  $s_p$  denote the share of `inctot` from business income within a percentile of the unadjusted `inctot` distribution. The adjustment we apply is

$$y_i^{adj} = y_i^{obs} (1 + \lambda s_{p(i)})$$

where  $\lambda$  is a positive scalar to adjust for underreporting. We calibrate  $\lambda$  so that average adjusted physician earnings equals mean earnings scaled by disclosed IRS-to-ACS earnings ratio. Let  $w_i$  be the ACS sample weight for individual  $i$ , and let  $\mathcal{P}$  be the set of physicians

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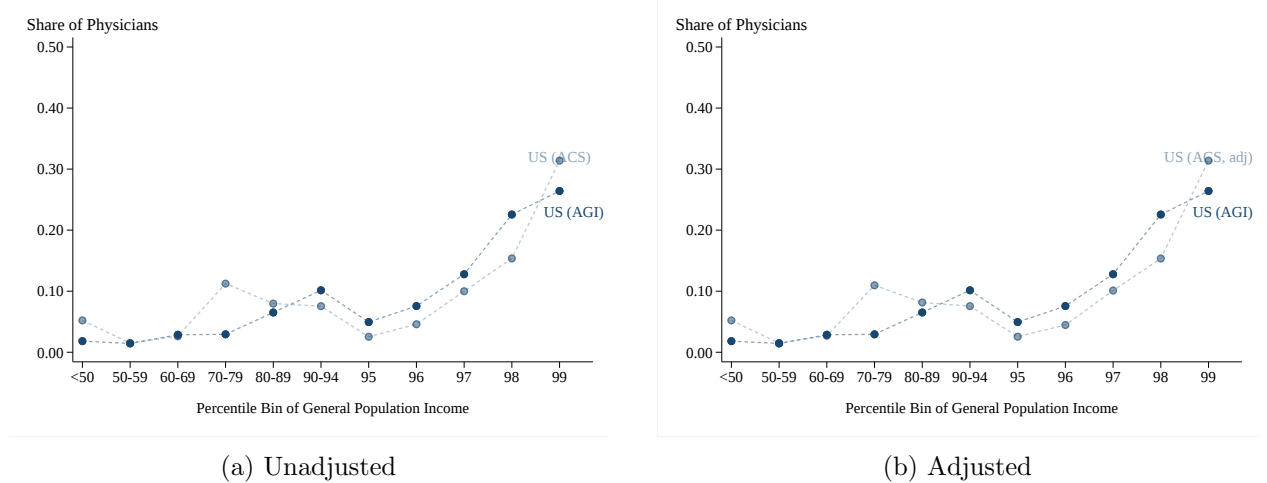
<sup>2</sup>We measure business income using the IPUMS variable `incbus00`. We set negative values to 0.

in IPUMS. We solve for  $\lambda$ .

$$\begin{aligned}
\bar{y}_{i \in \mathcal{P}}^{adj} &= 1.42 \cdot \bar{y}_{i \in \mathcal{P}}^{obs} = \frac{\sum w_i y_i^{obs} (1 + \lambda s_{p(i)})}{\sum w_i} \\
&= \frac{\sum w_i y_i^{obs}}{\sum w_i} + \lambda \frac{\sum w_i y_i^{obs} s_{p(i)}}{\sum w_i} \\
&= \bar{y}_i^{obs} + \lambda \frac{\sum w_i y_i^{obs} s_{p(i)}}{\sum w_i} \\
1.42 \cdot \bar{y}_i^{obs} - \bar{y}_i^{obs} &= \lambda \frac{\sum w_i y_i^{obs} s_{p(i)}}{\sum w_i} \\
(1.42 - 1) \bar{y}_i^{obs} \sum w_i &= \lambda \sum w_i y_i^{obs} s_{p(i)} \\
(1.42 - 1) \sum w_i y_i^{obs} &= \lambda \sum w_i y_i^{obs} s_{p(i)} \\
\implies \lambda &= \frac{(1.42 - 1) \sum y_i^{obs} w_i}{\sum w_i y_i^{obs} s_{p(i)}} \\
&= 4.55
\end{aligned}$$

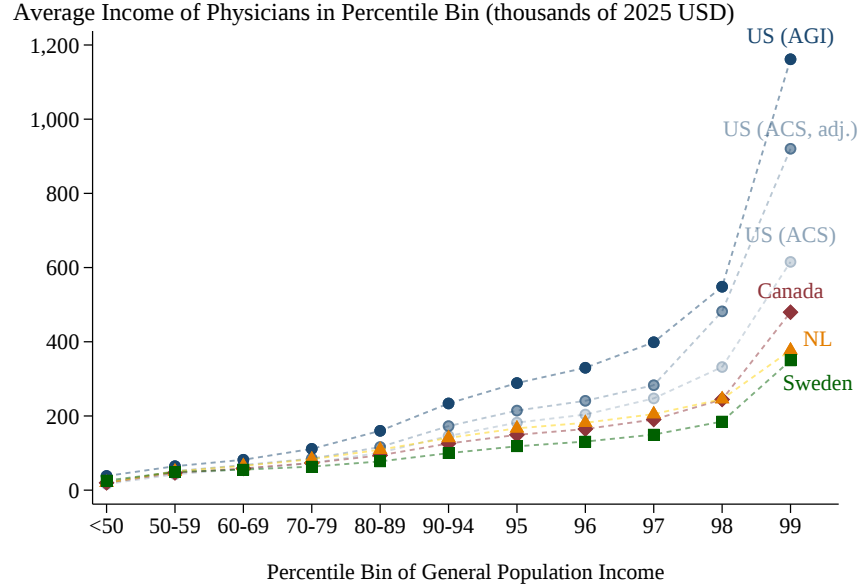
Figure A.1 plots the share of physicians in each percentile bin before and after the underreporting adjustment. Figure A.2 plots average physician earnings in each percentile bin including the adjusted `inctot` series. The adjusted income series lies between AGI and unadjusted `inctot`.

Figure A.1: U.S. physicians' location in the national income distribution



Notes: Disclosure Review Board approval no. CBDRB-FY21-009, CBDRB-FY2021-CES010-015, CBDRB-FY2021-CES010-01, CBDRB-FY23-0319.

Figure A.2: Average physician earnings by percentile bin, adjusted for underreporting



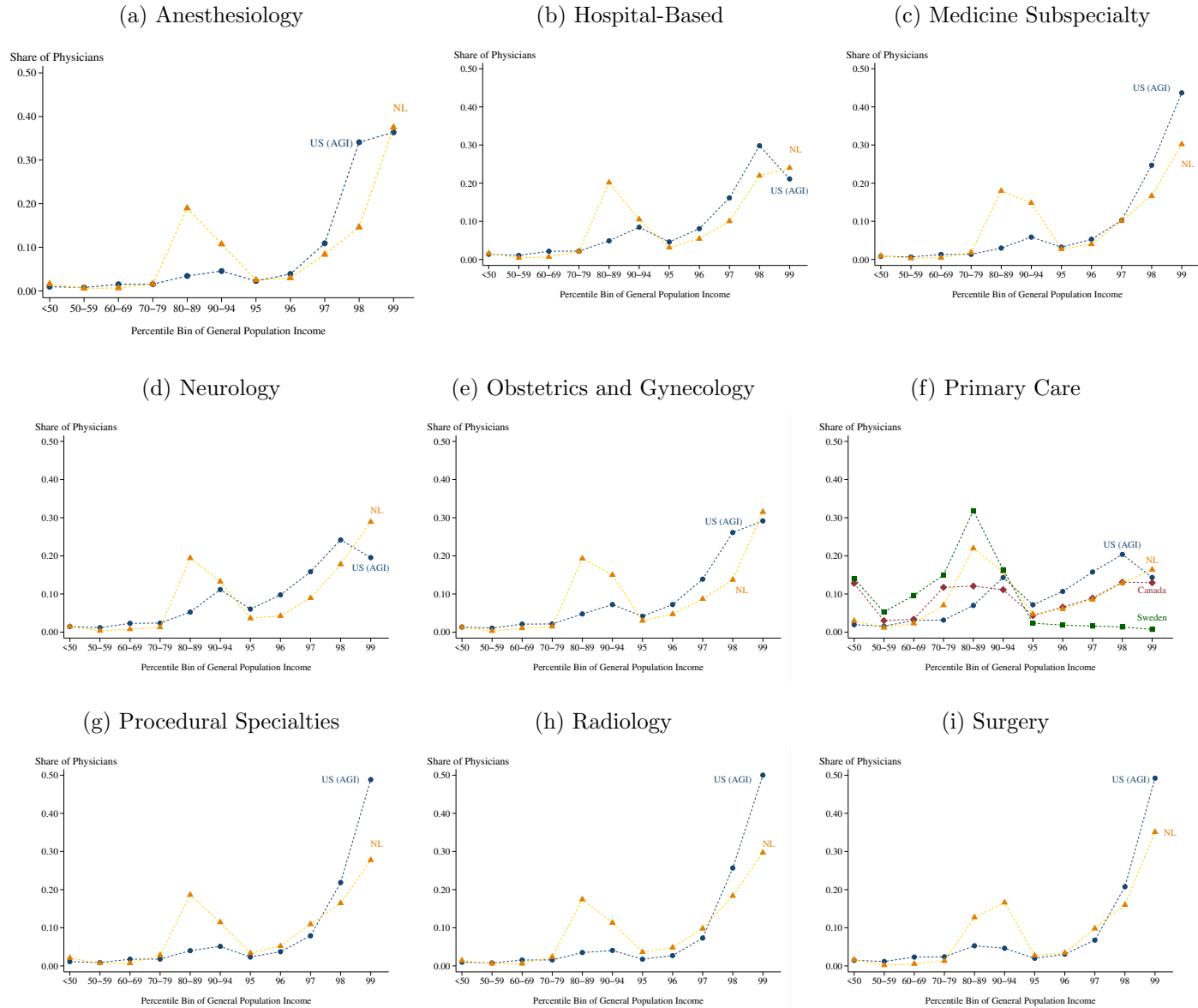
*Notes:* Disclosure Review Board approval no. CBDRB-FY21-009, CBDRB-FY2021-CES010-015, CBDRB-FY2021-CES010-01, CBDRB-FY23-0319.

## B Additional Results

### B.1 U.S.-Netherlands Comparison by Specialty

Our most granular specialty measures are for the U.S. and the Netherlands. In the paper, we compare the relative position of OB/GYNs and Surgeons. Here, we present the full set of specialty comparisons.

Figure B.1: U.S. and Netherlands relative income distributions by specialty



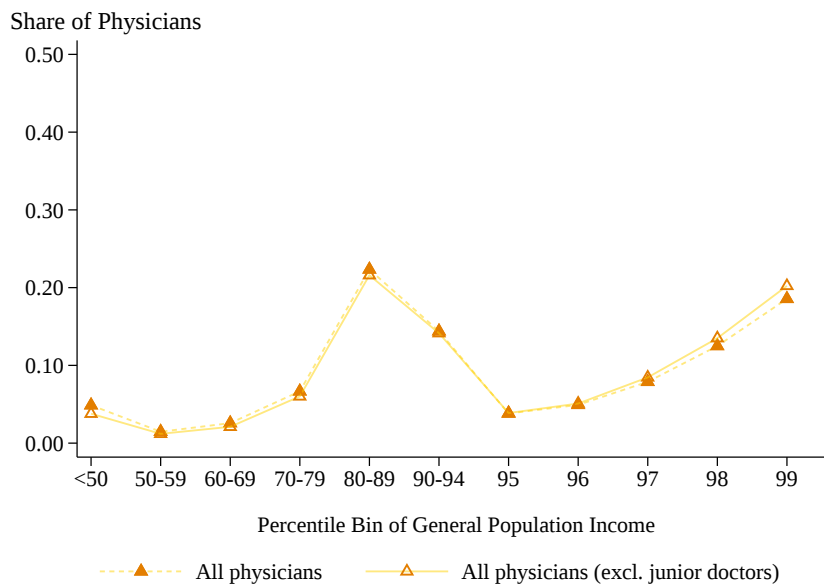
Notes: Disclosure Review Board approval no. CBDRB-FY2020-CES005-035.

## B.2 Junior Doctors in the Netherlands

It is relatively common for physicians in the Netherlands to complete medical school, register in the Professions in Individual Healthcare (BIG) register, but take substantial time to complete a residency (or never do so). These physicians in the Netherlands can practice medicine as a consultant or as an assistant doctor. In 2024, 17% of doctors in the BIG register had not completed a residency within 10 years of first appearing in the register.<sup>3</sup> We classify these doctors as “junior doctors”, and test whether including them in the definition of “All physicians” affects our results.

Figure B.2 shows that the shares of physicians in each income bin remain nearly identical when junior doctors are excluded. In the paper, we use the Netherlands sample that includes junior doctors in the definition of “All physicians”. This is to be consistent with the United States, where medical residents with NPI numbers appear in our sample.

Figure B.2: Netherlands physicians location in the income distribution



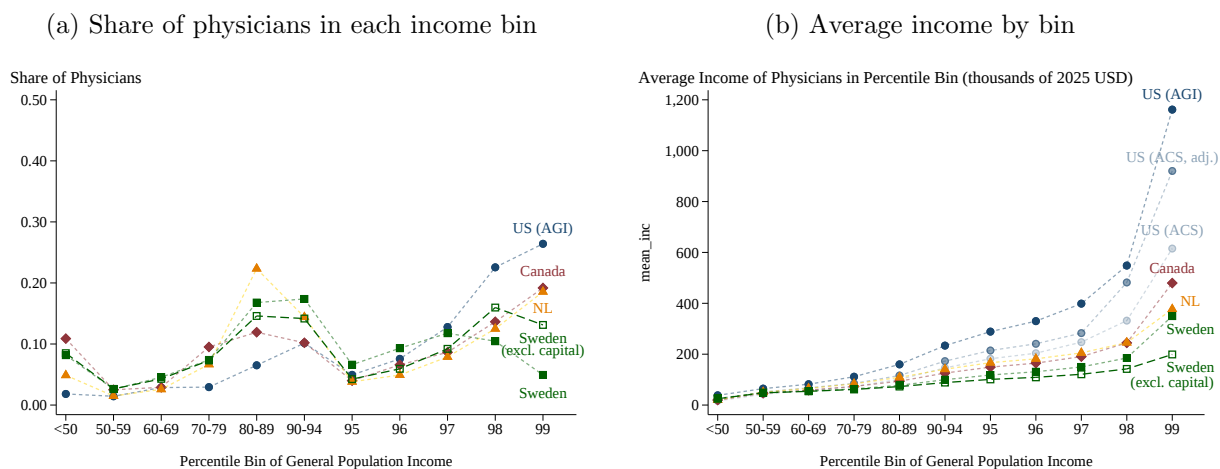
## B.3 Swedish results excluding capital income

Our primary measure for Swedish physician income is total taxable income. Previous research (see, *e.g.* Karimi, Lucke, and Palme, 2025) has shown that realized capital gains constitute an important component of income at the top of the income distribution. Figure B.3 shows

<sup>3</sup>Some of these junior doctors may have started a residency program and never finished it, while others may have never started residency at all. We cannot distinguish between these two pathways because we only observe residency information once a doctor completes a residency program.

how the results of the paper change when we exclude capital income from the Swedish income measure. We find that 13% of Swedish physicians are located in the 99th percentile of the income distribution (vs. 5% in our main income measure).

Figure B.3: Comparison of main results including and excluding capital income in Sweden



*Notes:* Disclosure Review Board approval no. CBDRB-FY21-009, CBDRB-FY2021-CES010-015, CBDRB-FY2021-CES010-01, CBDRB-FY23-0319.

## C Details of the Counterfactual Analysis

### C.1 Calculating counterfactual incomes

Average physician incomes can be expressed as a weighted average of the mean incomes in each percentile bin, with weights given by the share of physicians in each bin. Our counterfactual income calculations change these weights while holding constant the average income in each bin. We denote by “Country 1” the country from which we obtain the average income in each bin. We then calculate counterfactual incomes where we weight these bin-level averages using another country’s (denoted “Country 2”) share of physicians in each bin. Using observed and counterfactual average physician incomes, we then compute what fraction of the actual difference in physician incomes between Country 2 and Country 1 can be (statistically) explained by differences in the relative location of physicians in the national income distribution (the weights).

$$\% \text{ Country 2} - \text{Country 1 inc. gap explained} = \frac{\text{Ctfl. Country 1} - \text{Obs. Country 1}}{\text{Obs. Country 2} - \text{Obs. Country 1}}$$

For example, let Country 1 be the U.S., and Country 2 be Canada. Observed incomes are \$443,300 for U.S. physicians and \$194,700 for Canadian physicians. Taking the U.S. average physician incomes by bin as given, and calculating a counterfactual average U.S. physician income using the Canadian relative incomes distribution gives \$336,300. Thus, the share of the U.S.-Canada physician incomes difference explained by differences in relative incomes distributions is

$$\frac{336,300 - 443,300}{194,700 - 443,300} = 43\%.$$

For this exercise, we measure U.S. incomes using our adjusted ACS measure. Using AGI would risk overstating income differences between the U.S. and other countries. The share of the U.S.-other country incomes difference explained by differences in relative incomes distributions is similar using either income measure.

Table C.1 reports the results of this counterfactual exercise. The percentages appear in the main text; here, we further report the counterfactual and observed mean incomes for each country.

Table C.1: Counterfactual incomes:  
Mean Country 1 bin incomes, weighting by shares from Country 2

|                       |                                               | Country 2 |        |        |     |
|-----------------------|-----------------------------------------------|-----------|--------|--------|-----|
|                       |                                               | US        | Canada | Sweden | NL  |
| Observed mean income: |                                               | 443       | 195    | 115    | 186 |
| <u>Country 1:</u>     |                                               |           |        |        |     |
| US                    | Counterfactual mean income:                   |           | 336    | 228    | 333 |
|                       | % of (Country 2 - US) inc. gap explained:     |           | 43%    | 66%    | 43% |
| Canada                | Counterfactual mean income:                   | 247       |        | 145    | 195 |
|                       | % of (Country 2 - Canada) inc. gap explained: | 21%       |        | 63%    | 0%  |
| Sweden                | Counterfactual mean income:                   | 187       | 150    |        | 150 |
|                       | % of (Country 2 - Sweden) inc. gap explained: | 22%       | 44%    |        | 49% |
| NL                    | Counterfactual mean income:                   | 221       | 183    | 151    |     |
|                       | % of (Country 2 - NL) inc. gap explained:     | 14%       | -33%   | 49%    |     |

*Notes:* Disclosure Review Board approval no. CBDRB-FY23-0319, CBDRB-FY21-009, CBDRB-FY2021-CES010-015, CBDRB-FY2021-CES010-01.

## C.2 Counterfactuals vs. national health expenditures

The paper considers how two counterfactual scenarios would affect national health expenditures in the U.S. In the first, we change U.S. physicians’ average incomes to equal Swedish physicians’ average incomes. In the second, we change U.S. physicians’ relative income distribution to match Swedish physicians’ relative income distribution (relative to the respective country’s national income distribution). We calculate the magnitude of each counterfactual change in terms of total dollars, physician earnings as a share of total national health expenditures, and expenditure as a share of GDP. This section describes how we conduct this calculation.

We measure U.S. incomes using our adjusted ACS measure of individual total income. This choice of measure is conservative; using AGI would risk overstating the difference in incomes between the U.S. and other countries (because AGI includes spousal income), whereas our adjusted ACS measure would, if anything, understate the difference in incomes between the U.S. and other countries, since IPUMS incomes are top coded in the 99.5th percentile of the income distribution.

For the U.S., we measure national health expenditures (NHE) using data from the Centers for Medicare & Medicaid Services National Health Expenditure Accounts (NHEA). For GDP in all countries and NHE in non-U.S. countries, we use data from the World Health Organization (WHO) Global Health Expenditure Database. We use measures from 2023, as it is the most recent year available in both sources. Gottlieb et al. (2025) estimate that physician incomes comprise 8.6% of total U.S. NHE. For the other countries, we calculate the analogous share by multiplying average physician incomes by the number of physicians and dividing by total NHE.

Table C.2 reports the results. The counterfactuals involving Sweden are the same as those reported in the main text. Relative to these, reducing mean U.S. physician incomes to the levels observed in Canada or the Netherlands would result in smaller reductions in total healthcare spending. If U.S. physician incomes shifted to match the relative distribution of physician incomes in Canada or the Netherlands, reductions in physician earnings would be smaller relative to the analogous reductions under the Swedish counterfactual, but the reductions in health expenditure would be much smaller as well, accounting for approximately 2% of total national health expenditures in the U.S.

Table C.2: Reductions in U.S. physician income and national health expenditures under counterfactual scenarios

|                                                    | Sweden    | Canada    | Netherlands |
|----------------------------------------------------|-----------|-----------|-------------|
| <b>Panel A: Match mean income level</b>            |           |           |             |
| $\Delta$ mean physician income (2025 USD)          | \$342,900 | \$263,400 | \$272,400   |
| % change in mean physician income                  | 75%       | 57%       | 59%         |
| $\Delta$ total healthcare spending (billions)      | \$291     | \$223     | \$231       |
| % change total healthcare spending                 | 6%        | 4.4%      | 4.5%        |
| $\Delta$ spending as % of U.S. GDP                 | 1.0%      | 0.8%      | 0.8%        |
| <b>Panel B: Match relative income distribution</b> |           |           |             |
| $\Delta$ mean physician income (2025 USD)          | \$230,400 | \$121,800 | \$124,700   |
| % change in mean physician income                  | 50%       | 27%       | 27%         |
| $\Delta$ total healthcare spending (billions)      | \$195     | \$103     | \$106       |
| % change total healthcare spending                 | 3.8%      | 2.0%      | 2.1%        |
| $\Delta$ spending as % of U.S. GDP                 | 0.7%      | 0.4%      | 0.4%        |

*Notes:* This table reports counterfactual results where we replace U.S. physician incomes with those from other countries. Panel A shows the resulting reductions in physician income and total healthcare spending when we replace mean U.S. physician incomes with mean incomes from another country, specified in the column. Panel B shows the analogous results where we re-weight U.S. physician incomes to match the relative income distribution of another country. Income for the U.S. is measured using our adjusted ACS measure of individual total income. Disclosure Review Board approval no. CBDRB-FY23-0319, CBDRB-FY21-009, CBDRB-FY2021-CES010-015, CBDRB-FY2021-CES010-01.

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