

# Medical Spending in the US: Facts from the Medical Expenditure Panel Survey Data Set\*

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## Abstract

We document facts about the US population's medical spending using the Medical Expenditure Panel Survey data set. We find that for the entire population, around 44 per cent of total medical spending is paid by private insurance, but there is a substantial difference by age in terms of financing medical care: for working-age adults (25 to 64 years old), private insurance covers around 57 per cent of total medical spending, whereas for the elderly (aged 65 or over), the largest payer is the government, which covers 65 per cent of the total. Inpatient hospital care accounts for a third of aggregate medical expenditures. Medical spending is highly concentrated: the top 5 per cent of spenders account for more than half of the total. An even higher concentration is observed with hospital spending, where the top 5 per cent of spenders contribute around 80 per cent. The concentration in medical spending decreases with age: the Gini coefficient of total medical spending is 0.75 for people between ages 25 and 64 and 0.63 for people aged 65 or over. We find that the average medical spending of people in the bottom income quintile is higher than that

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of people in the top income quintile for all age groups. In terms of persistence of medical spending, we find that the correlation of medical expenditure in two consecutive years is 0.36. When persistence is measured by quintile of the medical spending distribution, the medical spending of people in the bottom and top quintiles has higher persistence than that of other groups.

### **Policy points**

- In the US, those at the top of the income distribution spend nearly three-quarters as much on medical care as those at the bottom.
- Most medical care for the working-age population is paid privately either out-of-pocket or by private insurance, whereas the government is the primary payer for those aged 65 and older.
- Medical spending is highly concentrated: the top 5 per cent of spenders account for more than half of the total expenditure.
- Despite the fact that most medical care is paid for by the private sector for the working-age population, low-income people have higher average medical spending than high-income people at all ages.
- Medical spending is very persistent, especially for those at the bottom and top of the medical spending distribution.

## **I. Introduction**

In this paper, we document facts about the US population's medical spending. The US represents an interesting case study because, unlike other developed countries, it does not have universal public health insurance. Individuals in the US obtain health insurance from different sources and, in most cases, the source of insurance coverage changes over the life cycle. People aged 65 or over are eligible for public health insurance, whereas the majority of the non-elderly population are covered by private insurance. Certain groups of young adults are uninsured or are covered by means-tested public health insurance. As a result, there is inequality of access to health care, and an important question is how this may affect medical spending over the life cycle as well as the concentration of medical spending and its correlation with income.

For our analysis, we use the Medical Expenditure Panel Survey (MEPS) data set. This data set contains very detailed information about medical spending at the individual level. It covers individuals of all ages, but age is top-coded at 85. An important feature of MEPS is that medical spending information is collected at the event level (for example, visit to a specialist or hospital stay); thus, all spending can be linked to a particular health service. Individuals' responses are cross-checked with medical providers and insurance companies, which improves the accuracy of the data. However, because this data set only includes the non-institutionalised population and excludes

hospital stays over 45 days, it misses information on catastrophic medical spending.

The paper is organised as follows. Section II reviews the related literature. Section III provides a brief review of the US health insurance system. Section IV describes the MEPS data set and compares certain aggregate statistics constructed from MEPS with other data sets. Section V documents facts related to the distribution of medical spending and its correlation over time. Section VI describes the evolution of medical spending over the life cycle. Section VII concludes.

## II. Related literature

This paper relates to the literature documenting micro-level facts about individual medical spending over the life cycle in the US. The studies in this area differ in terms of the data set they use and the subset of the population they consider. In particular, Crystal et al. (2000) and De Nardi et al. (this issue) use the Medicare Current Beneficiary Survey (MCBS), whereas Goldman and Zissimopoulos (2003), Hurd and Rohwedder (2009) and Fahle, McGarry and Skinner (this issue) use the Health and Retirement Survey (HRS) data set, which includes individuals over the age of 50. Because neither the MCBS nor the HRS data set includes young individuals, all the aforementioned studies focus on the elderly population. Evans and Humpherys (2015), Hirth et al. (2015) and Hirth et al. (this issue) use the claims data and focus on non-elderly individuals.

In contrast to the studies above, studies that use MEPS can analyse medical spending of both the elderly and non-elderly population. Monheit (2003) studies the persistence and concentration of medical spending using the 1996 and 1997 waves of MEPS. Jung and Tran (2014) use MEPS to estimate age profiles of average medical spending, controlling for both time and cohort effects. The Agency for Healthcare Research and Quality provides regular statistical briefs summarising certain patterns from the MEPS data set. There are also several studies that compare MEPS with other data sets. Selden et al. (2001), Sing et al. (2006) and Bernard et al. (2012) compare aggregate medical expenditure estimates using MEPS and National Health Expenditure Accounts (NHEA). Aizcorbe et al. (2012) compare the medical spending of people with employer-based health insurance in MEPS and the MarketScan data.<sup>1</sup> Yabroff et al. (2009) compare medical costs among individuals with certain cancer diagnoses using MEPS and Medicare claims data.

<sup>1</sup>The MarketScan research database is a nationwide convenience sample of patients from all providers of care. It collects claims data from employers, health plans and state-level Medicaid agencies (Aizcorbe et al., 2012). In 2008, the number of individuals represented in the MarketScan database was 41 million (Hirth et al., 2015).

### III. Institutional framework

One important feature of the US health care system is the absence of universal public health insurance. Public health insurance still plays an important role in the US health insurance system, but it covers only certain groups of the population. The two largest public health insurance programmes are Medicare and Medicaid. Medicare covers people older than 65 as well as disabled young people. Medicaid is a means-tested programme that covers individuals of all ages whose resources fall below a certain threshold. For many low-income young adults, Medicaid is the main source of insurance coverage. For people over 65, Medicaid serves as supplemental health insurance that covers certain categories of medical spending not covered by Medicare, most importantly nursing home stays. Apart from Medicaid and Medicare, there are several other smaller public insurance programmes targeted at specific groups of people – for example, the State Children’s Health Insurance Program (SCHIP), Tricare (for active military personnel and their dependants) and the Veteran’s Health Administration (for former military personnel). Because public health insurance covers people who, on average, have high medical spending (the elderly and the disabled), the government contributes a substantial share of the national health expenditure (see Section V.1).

For non-elderly adults in the US, there is substantial heterogeneity in terms of sources of insurance coverage (Table 1). The majority of non-elderly adults (68 per cent) are covered by private insurance, mostly obtained through employers (59 per cent). Employer-sponsored health insurance (ESHI) is tightly regulated: employers cannot differentiate premiums based on age or the health conditions of individuals. Thus, all employees in the same company are charged the same premium as long as they buy the same plan. This is one of the reasons large firms are more likely to offer ESHI to their employees:

TABLE 1  
*Distribution of people aged 18–64, by insurance status in 2013*

<i>Type of insurance</i>	<i>Coverage (%)</i>
Uninsured	18.4
Public insurance	18.2
Private insurance	68.1
Employer-based	59.2
Directly-purchased	9.1

*Note:* Individuals with both public and private insurance are included in both categories, so the distribution by coverage does not sum to 100 per cent. Similarly, those with both employer-based and directly-purchased insurance are included in both categories.

*Source:* US Census.

TABLE 2  
*Distribution of people aged 18–64, by insurance status and income in 2013*

Type of insurance	Per cent					
	Household income					
	<\$25,000	\$25,000– \$50,000	\$50,000– \$75,000	\$75,000– \$100,000	\$100,000– \$150,000	>\$150,000
Uninsured	21.6	18.7	13.1	9.7	6.3	5.3
Public insurance	62.5	45.9	30.8	21.5	17.3	14.1
Private insurance	26.7	50.3	69.7	79.6	86.1	89.8

*Note:* Individuals with both public and private insurance are included in both categories, so the distribution by coverage does not sum to 100 per cent.

*Source:* US Census.

in small firms, one employee with poor health conditions can increase the premiums for the entire pool of workers. In addition, large firms face lower loading on their premiums than small firms. In 2013, 99 per cent of all large firms (with 200 or more workers) offered health benefits to their workers, whereas only 57 per cent of small firms (3–199 workers) did so.<sup>2</sup>

Outside the employer-based market, the private health insurance market has historically been rather small: only 9 per cent of non-elderly adults purchase their health insurance directly in the individual market. One important difference between directly-purchased insurance and ESHI is that, until recently, insurers in most states could risk-adjust prices in the individual market, i.e. sick individuals were charged higher premiums. Moreover, individuals with chronic health conditions could be denied coverage or only offered plans that do not cover pre-existing conditions. The situation in the individual market changed substantially in 2014, when the Patient Protection and Affordable Care Act (ACA), which has introduced several new regulations in the health system, became effective. In particular, insurance companies are not allowed to adjust premiums based on the health conditions of individuals (even though premiums can vary by age) or deny/limit coverage based on pre-existing conditions. These measures, coupled with subsidies for people buying individual health insurance, are increasing the share of individual (versus group) insurance.

Another important characteristic of the US health insurance system is that coverage varies significantly by income level (Table 2). More specifically, among low-income individuals (income less than \$25,000), 21.6 per cent are uninsured and only 26.7 per cent are covered by private insurance, whereas among high-income individuals (income in the range \$100,000–\$150,000), only 6.3 per cent are uninsured and 86.1 per cent are covered by private

<sup>2</sup>Kaiser Family Foundation, 2013.

insurance. In Section V, we will discuss how this phenomenon can possibly affect the income–medical-spending gradient.

## IV. The MEPS data set

### 1. Description

For our analysis, we use data from the 1999–2012 waves of the Medical Expenditure Panel Survey, a nationally representative survey of the civilian non-institutionalised population produced by the Agency for Healthcare Research and Quality (AHRQ). It includes data on health care use, expenditures, sources of payment, health insurance coverage, health status, and demographic and socio-economic characteristics. The survey is designed as a two-year rotating panel. It includes five rounds of interviews covering two full calendar years. Each annual sample size is about 15,000 households. The set of households selected for each panel of MEPS is a subsample of households participating in the previous year's National Health Interview Survey (NHIS) conducted by the National Center for Health Statistics. While this survey oversamples African Americans and Hispanic people, MEPS further oversamples additional policy-relevant subgroups, such as low-income households. MEPS adjusts (post-stratifies) person weights so that it produces the same poverty rates by demographic groups as the Current Population Survey (CPS), a data set used as the source of official poverty statistics in the US.<sup>3</sup>

MEPS consists of three components: household, medical provider and insurance. The Household Component (HC) data are based on a survey of individuals and are publicly available. The Medical Provider Component (MPC) is a follow-back survey of medical providers reported by HC respondents and also providers who provide services for patients in hospitals but bill separately from hospitals. MPC data are used to cross-check information collected from the household survey to improve the accuracy of the expenditure data in HC. The Insurance Component (IC) comes from a survey of employers and collects information on health insurance plans offered. Neither MPC nor IC data are publicly available.<sup>4</sup> Because we use HC in our analysis, we refer to MEPS HC as MEPS in the following discussion.

In our sample, we dropped individuals with missing values of age or medical spending. This leaves us with 257,222 individuals who contribute to 463,495 person-year observations. For our longitudinal analysis in Section V.3, we keep only individuals we observe for two years, and this reduces our sample size to 198,517 individuals. We use the cross-sectional weights and longitudinal weights provided by MEPS for the cross-sectional and longitudinal pools,

<sup>3</sup>Banthin and Selden, 2006.

<sup>4</sup>IC data are available on the AHRQ website in tabular form only.

respectively. Since each wave is a representation of the population in that year, when pooling several years (or waves) together, the weight of each individual is divided by the number of years (or waves). We use 2014 as the base year. All value variables are normalised to the base year using the Consumer Price Index (CPI).

The MEPS data are collected at the event level and then they are summed to produce annual utilisation and expenditure. MEPS includes the following categories of medical expenses: office-based visits (medical provider visits that took place in office-based settings and clinics), hospital events (inpatient and outpatient care, emergency room visits), dental care, vision aids, home health care, other medical equipment and services, and prescribed medicine. It should be noted that MEPS does not include information on events such as nursing home care and hospital stays longer than 45 days. This does not allow using the data set to analyse medical spending before death. In addition, age in MEPS is top-coded at 85 years, which limits the analysis of medical spending by age for the very elderly.

MEPS defines medical expenditure as the sum of direct payments for health care services made by insurers or out-of-pocket. Payments that cannot be linked to a particular patient are not included in the MEPS definition of expenditure (for example, Medicaid Disproportionate Share Hospital payments<sup>5</sup>). Similarly, uncollected liability and bad debt are not counted as expenditures because no payment is made. Moreover, MEPS adjusts household-reported insurance payments because households may not know that their insurer negotiated a discount with the provider. In addition, medical expenditure in MEPS does not include over-the-counter drugs. MEPS also reports charges variables with the caution that they do not represent the actual amount paid for the services. The difference between charges and actual payments can be substantial. In our sample, the average charges for all services excluding prescription drugs are \$6,609, while the average expenditures are only \$3,092.<sup>6</sup> This large discrepancy suggests that negotiated discounts, bad debt and free care are substantial.

MEPS collects income and medical spending information at the individual level. The income sources in MEPS include wage and salary income, business and sales income, interest and dividend income, and pension and social security income, as well as income from public assistance, Supplemental Security Income (SSI), child support, Temporary Assistance for Needy Families (TANF) and unemployment compensation. All person-level income amounts (both total and separate sources of income) are top-coded at the 99<sup>th</sup> percentile.

<sup>5</sup>States make Disproportionate Share Hospital payments to hospitals that treat large numbers of low-income patients.

<sup>6</sup>The median charges for our sample are \$802 and the median expenditures are \$541.

## 2. Comparison with other data sets

MEPS is not designed to add up to the aggregate national estimates of medical expenditure. In fact, the discrepancy between MEPS and the aggregate statistics is substantial. Table 3 shows the ratio of aggregate medical spending computed from the National Health Expenditure Accounts to the aggregate spending computed from MEPS.<sup>7,8</sup> Overall, the national average is at least 65 per cent higher than the corresponding statistics in MEPS. Two important sources of this discrepancy are the absence of certain categories of medical care from MEPS (for example, nursing home care) and the different approach to defining medical spending. As mentioned above, medical spending in MEPS is based on the actual payments made for a particular service. In contrast, NHEA estimates are based on providers' revenue even if it is not associated with a particular event (for example, revenue from hospital gift shops or parking).

Sing et al. (2006) and Bernard et al. (2012) provide a detailed study of the discrepancy between the NHEA and MEPS estimates. The first study compares the MEPS and NHEA estimates for 2002 and the second compares those for 2007. The authors construct an adjusted NHEA estimate of aggregate medical spending that excludes nursing home costs, acute health expenditures of people who spend more than 45 days in a hospital, expenditures for active

TABLE 3  
*Medical expenses in MEPS and NHEA*

	<i>MEPS</i> <i>(\$bn)</i>	<i>NHEA</i> <i>(\$bn)</i>	<i>NHEA/MEPS</i>
2000	627.9	1,165.7	1.86
2001	726.4	1,265.8	1.74
2002	810.7	1,371.9	1.69
2003	895.5	1,482.1	1.66
2004	963.9	1,592.3	1.65
2005	1,023.8	1,700.9	1.66
2006	1,033.1	1,809.3	1.75
2007	1,126.1	1,921.0	1.71
2008	1,148.4	2,017.3	1.76
2009	1,259.5	2,117.9	1.68
2010	1,263.4	2,196.2	1.74
2011	1,330.7	2,281.8	1.71
2012	1,350.7	2,379.3	1.76

*Note:* Current dollars.

<sup>7</sup>The NHEA is based on the aggregate provider revenue data.

<sup>8</sup>When computing the aggregate medical expenses in Table 3, we include all observations, even those with missing data on age.



TABLE 4  
*Medicare enrolment and expenditures for the population aged 65 or over:  
 MEPS and MCBS*

	<i>Enrolment (million)</i>		<i>Mean expenditure (\$)</i>		<i>Expenditure, MCBS/MEPS</i>
	MEPS	MCBS	MEPS	MCBS	
1999	32.4	35.0	4,166	6,450	1.55
2000	32.9	35.1	4,065	6,650	1.64
2001	34.2	35.5	4,442	7,030	1.58
2002	34.3	35.9	5,076	7,490	1.48
2003	34.9	36.2	5,272	7,510	1.42
2004	35.5	36.3	5,547	7,690	1.39
2005	35.6	36.6	5,260	7,880	1.50
2006	35.9	36.9	5,972	8,640	1.45
2007	36.7	37.8	6,696	8,990	1.34
2008	37.7	38.7	5,926	9,110	1.54
2009	38.4	39.6	6,247	9,210	1.47
2010	39.2	40.6	6,632	9,340	1.41

*Note:* Adjusted to 2014 dollars.

military personnel and foreign visitors, and several other categories of medical expenditure not included in MEPS. The resulting estimate of the aggregate medical spending from NHEA is much closer to its counterpart in MEPS: the difference is reduced to 14 per cent in 2002 and to around 18 per cent in 2007. The authors attribute the remaining difference to factors such as the presence of undetected fraudulent billing practices in NHEA, under-reporting of prescription drug spending in MEPS and the under-representation of people with more than \$100,000 in total annual health expenditures in MEPS.

To understand how accurately MEPS captures information on the elderly, in Table 4 we compare the Medicare enrolment and the average medical spending per Medicare beneficiary for people aged 65 or over in MEPS and the Medicare Current Beneficiary Survey.<sup>9</sup> Numbers from MCBS in the table are from De Nardi et al. (this issue). MEPS underestimates Medicare enrolment compared with MCBS, especially in 1999 and 2000, but after 2002 the gap between the two data sets is around a million individuals. The difference in average medical spending per beneficiary is more substantial: the MEPS estimates are lower and the gap between the two data sets varies between 34 and 64 per cent. This difference is driven by the same factors that account for the difference between MEPS and NHEA described earlier: the absence of information on nursing home care episodes and under-representation of high-cost cases.

<sup>9</sup>MCBS is a nationally representative survey of Medicare beneficiaries. More details on this data set are available in De Nardi et al. (this issue).

TABLE 5

*Distribution of people aged 18–64, by insurance status in 2012: MEPS and CPS*

<i>Type of insurance</i>	<i>MEPS</i>	<i>CPS</i>
Uninsured	18.4%	21.0%
Public insurance	16.4%	16.6%
Employer-based insurance	68.7%	67.2%

To understand how accurate the information on insurance coverage for non-elderly adults in MEPS is, we compare it with the aggregate data from the Current Population Survey. The CPS Annual Social and Economic Supplement (ASEC) is the most widely-cited source of estimates on health insurance and the uninsured.<sup>10</sup> ASEC is conducted in February, March and April, and respondents are asked about their health insurance coverage in the previous calendar year. Individuals are considered to be insured if they were covered by some health insurance for part or all of the year, and they are considered uninsured if they did not have any coverage for the entire year. Individuals who report multiple sources of coverage are included in several categories (for example, public and private insurance). We construct the insurance statistics from MEPS to be as close to the CPS definition as possible. MEPS asks individuals retrospectively about the source of their coverage for each month of the year. We define individuals as insured if they report having coverage for at least one month of the year. Individuals are classified as uninsured if they report having no coverage for all 12 months of the year. To be consistent with the CPS definition, we include individuals who report having both public and private insurance in both categories (because of this, the distribution of individuals by insurance does not sum to 100 per cent). Table 5 compares the resulting insurance statistics for people aged 18–64 in MEPS and CPS in 2012. Overall, the insurance coverage in MEPS is close to its counterpart in CPS. The percentage who are uninsured is higher in CPS; however, until recently, CPS produced higher estimates of the uninsured than other federal studies.<sup>11</sup> Czajka and Denmead (2008) compare eight data sets, including MEPS and CPS, and also find that CPS overestimates the number of uninsured compared with all other data sets. They conjecture that this happens because respondents in CPS answer the question of whether or not they were uninsured for the entire prior year based on the current insurance situation.<sup>12</sup>

Table 6 compares mean and median household income in MEPS and CPS. To construct household income in MEPS, we use the variable ‘total

<sup>10</sup>Smith and Medalia, 2013.

<sup>11</sup>Smith and Medalia, 2013.

<sup>12</sup>To address this problem, CPS redesigned insurance questions in 2013. More details on this are provided in Smith and Medalia (2013).

TABLE 6  
*Mean and median household incomes in 2012: MEPS and CPS*

	<i>MEPS</i>	<i>CPS</i>	<i>CPS/MEPS</i>
Mean	70,959	71,274	1.00
Median	55,691	51,017	0.92

*Note:* Current (2012) dollars.

person-level income' (TTLP), which was designed to match as closely as possible the CPS definition of income. Since MEPS provides all the information at the individual level, we link individuals to a family and then sum the income of all family members. MEPS allows linking of individuals to families using several definitions of a family. The first definition is based on the eligibility for a family insurance plan. The group of individuals linked in this way is referred to as the health insurance eligibility unit (HIEU). The second way to link individuals is based on the CPS definition of a family. The third way is the MEPS definition of a family, which differs from the CPS definition in terms of how it treats foster children and cohabitants. To construct household income, we use the CPS definition of a family and compute mean and median income using the family weights provided in MEPS. Mean incomes in the two data sets are almost identical, but the median income is over 9 per cent higher in MEPS. Czajka and Denmead (2008) provide a more detailed comparison between the MEPS and CPS income distributions and find that MEPS has higher income than CPS between the 20<sup>th</sup> and 80<sup>th</sup> percentiles. For the bottom and top income quintiles, however, MEPS underestimates income compared with CPS. The authors caution that this comparison may be not very informative because MEPS post-stratifies the data to the CPS poverty distribution; thus, it is not clear whether the discrepancy in income data is due to the way the data are collected or to the post-stratification.

## **V. Medical expenditures in the cross-section and over time**

### **1. The cross-sectional distributions**

Table 7 displays the distribution of medical spending by payers and by type of care. Payers include out-of-pocket spending, private insurance and the government (Medicaid, Medicare and other public insurance). The contributions by payer do not sum to 100 per cent because we do not report contributions from Tricare, worker compensation and unclassified sources. For spending by Tricare, this variable is only available since 2000. We do not report spending covered by worker compensation and spending by unclassified sources because it is not clear which type of payers they belong to. The expenditure categories reported in Table 7 are hospital costs (split into inpatient

TABLE 7  
*Percentage of total medical expenditures, by payer, expenditure type, age and gender: MEPS data*

	<i>All</i>		<i>Aged &lt;25</i>		<i>Aged 25-64</i>		<i>Aged ≥65</i>		
	All	Men	Women	All	Men	Women	All	Men	Women
<i>Payers</i>									
Out-of-pocket	17.5	16.3	18.5	18.8	18.1	19.4	18.1	17.0	18.9
Private insurance	43.8	43.3	44.2	50.9	51.1	50.8	57.1	56.0	57.9
Government	35.4	36.6	34.4	27.5	27.7	27.3	20.4	21.8	19.4
Medicaid	10.0	8.7	11.0	23.9	24.0	23.8	9.8	8.0	11.1
Medicare	21.7	22.0	21.4	0.8	1.0	0.6	6.9	7.9	6.2
Other government	3.7	5.9	2.0	2.8	2.8	2.8	3.7	6.0	2.1
<i>Expenditure types</i>									
Hospitals	42.5	44.3	41.1	39.3	38.4	40.1	42.3	44.3	40.9
Inpatient	33.3	35.1	31.9	32.2	31.1	33.3	31.6	33.8	30.0
Outpatient	9.2	9.2	9.3	7.1	7.3	6.8	10.8	10.5	11.0
Office-based visits	23.3	22.0	24.3	25.0	24.3	25.7	24.3	21.7	26.1
Prescription drugs	20.8	20.7	20.9	13.4	15.3	11.7	22.0	22.6	21.6
Other	13.4	13.0	13.7	22.2	22.0	22.5	11.4	11.4	11.4

*Note:* This table reports average spending in each category divided by average total medical spending. The sum of expenditures by payers is not 100 per cent because we do not report spending by Tricare, worker compensation and unclassified sources. Private insurance payments are the sum of private insurance and 'other private' categories in MEPS. 'Other government' payments include payments by the Veterans' Administration, other federal, state and local sources and 'other public'. Hospital expenditures include the inpatient (including emergency room visits) and outpatient categories. 'Other' expenditure is the sum of the dental care, home health care, vision aids, and medical supplies and equipment categories.

and outpatient), office-based visits, prescription drugs and other costs, which are the sum of dental care, home health care, vision aids, and medical supplies and equipment. For all numbers in Table 7, we first calculate the means of each category of medical spending and the mean of total spending and then take their ratio. Table A1 in the online appendix reports the same statistics but when we first calculate the ratio of each category of spending to the total and then compute the average.

For the entire sample, the largest share of total medical spending is paid by private insurance (43.8 per cent), followed by the government as the second-largest payer (35.4 per cent). This distribution, however, significantly changes with age: for people between 25 and 64 years old, private insurance covers 57.1 per cent of total spending and the government covers 20.4 per cent, while for people aged 65 or over, the share of private insurance decreases to 17.0 per cent and the government's share increases to 65.4 per cent. This happens because of the change in the source of insurance coverage for most people after age 65 from private to public, as discussed in Section III. Compared with men, women have a higher percentage of their medical costs covered out-of-pocket (18.5 per cent for women versus 16.3 per cent for men) and by Medicaid (11.0 per cent versus 8.7 per cent), and this difference is particularly marked among people aged 65 or over.

In terms of the type of expenditure, the largest category is hospital costs, which constitute 42.5 per cent of total spending, most of which is inpatient care (33.3 per cent). Office-based visits and prescription drugs each account for around 20 per cent of total spending. Women spend considerably more on office-based visits between ages 25 and 64 (26.1 per cent for women versus 21.7 per cent for men), while men spend more on hospital care, especially when they are 65 or over (41.9 per cent for women versus 47.2 per cent for men).

In Table 8, we report the distribution of total and hospital medical spending as well as the distribution of out-of-pocket spending and spending for the most important payer type: private insurance for people younger than 65 and Medicare for people aged 65 or over. People in the top 5 per cent of the medical expenditure distribution spend on average around \$35,000, which is almost nine times higher than the average for the entire sample (\$3,905). The average spending of the top 5 per cent increases considerably with age: after age 65, the average spending of the top 5 per cent constitutes more than \$65,000. It should be noted that people in the top 5 per cent account for more than half (52 per cent) of total medical spending. This inequality decreases with age: for people in the 25–64 age range, the top 5 per cent of spenders account for 49 per cent of total spending, while for people of 65 or over, this number decreases to around 34 per cent. Inequality in hospital care spending is even higher: 70 per cent of the population spend almost nothing on hospital care, while those in the top 5 per cent of the distribution spend on average around \$24,000.

TABLE 8  
Medical spending percentiles, by age

By expenditure type		All			Aged <25			Aged 25–64			Aged ≥65		
Spending percentile	Total	Average	Hospital	% of total	Total	Average	Hospital	% of total	Average	Hospital	% of total	Average	Hospital
	spending	total	spending	total	spending	total	spending	total	spending	total	spending	total	spending
All	3,905	100.0	1,659	100.0	1,599	100.0	628	100.0	4,055	100.0	1,717	100.0	9,599
95–100%	35,473	52.0	23,913	80.6	15,216	55.4	10,479	88.1	36,779	49.2	24,877	77.6	65,600
90–95%	10,662	15.7	4,129	13.5	4,048	15.1	1,023	9.2	11,409	15.6	4,852	14.9	29,418
70–90%	4,028	24.1	473	5.9	1,412	21.1	86	2.7	4,538	25.1	628	7.5	13,435
50–70%	1,116	6.4	0	0.0	458	6.1	0	0.0	1,411	7.8	0	0.0	5,709
0–50%	167	1.8	0	0.0	82	2.2	0	0.0	212	2.3	0	0.0	1,689
By payer		All			Aged <25			Aged 25–64			Aged ≥65		
Spending percentile	Out-of-pocket	Average	Private insurance	% of total	Out-of-pocket	Average	Private insurance	% of total	Out-of-pocket	Average	Private insurance	% of total	Out-of-pocket
	spending	total	spending	total	spending	total	spending	total	spending	total	spending	total	spending
All	685	100.0	1,632	100.0	300	100.0	768	100.0	734	100.0	2,251	100.0	1,534
95–100%	5,154	46.7	16,569	66.5	2,625	61.1	7,539	71.5	5,294	42.1	22,532	62.2	9,006
90–95%	1,920	17.6	3,666	14.7	674	15.4	1,393	13.3	2,074	16.7	5,563	15.4	3,972
70–90%	780	27.7	1,075	16.9	236	20.1	405	14.5	930	29.5	1,764	19.3	2,127
50–70%	214	7.0	136	1.8	45	3.3	28	0.7	317	9.5	308	3.2	1,015
0–50%	17	1.0	0	0.0	1	0.1	0	0.0	38	2.2	2	0.0	282

Note: Adjusted to 2014 dollars.

TABLE 9  
*Mean total medical and hospital expenditures, by medical expenditure quintile, age and gender*

**All**

<i>Expenditure quintile</i>	<i>Total expenditure</i>			<i>Hospitals</i>		
	All	Men	Women	All	Men	Women
All	3,905	3,456	4,334	1,659	1,530	1,783
Bottom	0	0	12	0	0	0
Second	156	83	248	0	0	0
Third	618	422	856	0	0	0
Fourth	2,048	1,478	2,648	28	1	86
Top	14,161	12,785	15,215	7,575	7,028	8,126

**Aged 25–64**

<i>Expenditure quintile</i>	<i>Total expenditure</i>			<i>Hospitals</i>		
	All	Men	Women	All	Men	Women
All	4,055	3,470	4,616	1,717	1,537	1,889
Bottom	0	0	18	0	0	0
Second	182	63	366	0	0	0
Third	806	457	1,195	0	0	0
Fourth	2,445	1,647	3,234	44	0	159
Top	14,888	13,220	16,026	8,045	7,147	8,751

**Aged ≥65**

<i>Expenditure quintile</i>	<i>Total expenditure</i>			<i>Hospitals</i>		
	All	Men	Women	All	Men	Women
All	9,599	9,748	9,486	4,245	4,597	3,979
Bottom	439	354	516	0	0	0
Second	1,904	1,717	2,046	0	0	0
Third	4,041	3,783	4,223	23	5	40
Fourth	8,321	8,030	8,527	1,057	1,031	1,071
Top	31,992	33,131	31,090	19,625	21,324	18,338

*Note:* Adjusted to 2014 dollars.

The usage of hospital care increases with age, but even for people aged 65 or over, 50 per cent have almost zero hospital spending.

The bottom panel of Table 8 shows that, on average, people pay \$685 out-of-pocket; however, the top 5 per cent of spenders pay \$5,154 on average. As in the case of total spending, out-of-pocket spending increases substantially with age: people of 65 or over pay on average \$1,534, while the top

5 per cent of spenders of that age pay \$9,006 on average. It should be noted that the spending contributed by private insurance is more concentrated than total or out-of-pocket medical spending: the top 5 per cent of spenders account for more than 66 per cent of the total spending by private insurance, while they account for 52.0 per cent and 46.7 per cent of total and out-of-pocket spending respectively.

Table 9 shows the quintiles of total and hospital medical spending for men and women and for different age groups. On average, women spend more than men (\$4,334 versus \$3,456), but this difference disappears with age: for people aged 65 or over, the average spending of men (\$9,748) is almost the same as that of women (\$9,486). A similar trend is observed in hospital spending: women spend more than men when young, but men's spending becomes higher than women's for the older group.

## 2. The distribution by income

To understand how different the medical spending of people in different income groups is, we report the mean income and medical spending (both total and hospital) for each income quintile in Table 10. For this analysis, we exclude people younger than 25 because income is reported in MEPS at the individual level and many of the very young individuals do not have their own income but receive family transfers. One key observation from Table 10 is that the level of average medical spending does not increase with income quintile. In fact, people in the bottom income quintile spend more than people in the top quintile: the average spending of the former group is \$6,052, whereas the average for the latter one is \$4,333. This applies to both men and women, people older and younger than 65, and total and hospital spending. To illustrate this issue further, Table 11 displays the ratio of the average medical spending of people in the top income quintile to that of those in the bottom quintile. This ratio is always less than 1, and the largest difference in spending between the top and bottom income quintiles is observed for hospital care for men younger than 65 (0.41). It should also be noted that, for men, the gap between the top and bottom income quintiles in terms of average medical spending decreases with age.<sup>13</sup>

Table 12 displays the distribution of medical spending by income for different payers and different categories of expenditure. Table 13 provides

<sup>13</sup>It is important to note that the negative relationship between income and medical spending may result from the difference in composition: high-income people are, on average, healthier than low-income people (the existence of an income–health gradient is documented in a number of studies; see Cutler, Lleras-Muney and Vogl (2011) for a review). In this paper, our goal is to document the overall pattern of medical spending by income quintile without controlling for health status; thus, we remain agnostic about the direction of causality, leaving this issue for future research.



TABLE 10  
Income and medical expenditure, by income quintile, age and gender

**Aged ≥25**

Income quintile	Mean income			Mean expenditure			Mean hospitals		
	All	Men	Women	All	Men	Women	All	Men	Women
All	41,671	48,532	35,388	5,123	4,561	5,639	2,204	2,068	2,328
Bottom	2,784	6,101	1,132	6,052	6,675	5,440	2,795	3,323	2,417
Second	14,435	19,171	11,331	6,810	5,398	7,563	3,097	2,679	3,237
Third	26,397	32,274	21,537	4,867	4,234	5,573	2,183	1,990	2,382
Fourth	43,411	50,426	37,169	4,323	3,780	5,021	1,790	1,615	2,023
Top	92,425	105,155	79,804	4,333	3,646	5,106	1,634	1,350	1,917

**Aged 25–64**

Income quintile	Mean income			Mean expenditure			Mean hospitals		
	All	Men	Women	All	Men	Women	All	Men	Women
All	44,243	51,109	37,665	4,055	3,470	4,616	1,717	1,537	1,889
Bottom	2,426	6,461	577	5,190	5,379	4,790	2,388	2,644	2,129
Second	15,600	21,196	11,341	4,657	3,352	5,613	2,089	1,637	2,355
Third	28,716	34,579	23,496	3,585	2,996	4,008	1,621	1,413	1,715
Fourth	46,072	52,956	39,758	3,537	3,072	4,291	1,405	1,312	1,730
Top	96,023	108,336	83,396	3,810	3,105	4,619	1,435	1,096	1,726

**Aged ≥65**

Income quintile	Mean income			Mean expenditure			Mean hospitals		
	All	Men	Women	All	Men	Women	All	Men	Women
All	30,894	36,269	26,826	9,599	9,748	9,486	4,245	4,597	3,979
Bottom	4,389	5,104	4,053	9,791	10,117	9,669	4,549	5,229	4,258
Second	11,814	13,323	11,071	10,439	10,431	10,273	4,855	5,151	4,548
Third	18,223	21,673	16,345	9,987	10,485	9,849	4,551	5,197	4,194
Fourth	30,567	36,255	26,620	9,238	9,395	9,044	4,062	4,318	3,761
Top	71,688	84,858	60,802	8,864	8,693	8,916	3,523	3,541	3,426

Note: Adjusted to 2014 dollars.

TABLE 11  
Ratio of mean medical spending in the top income quintile to that in the bottom income quintile, by age and gender

Total expenditure				Hospitals			
Age	All	Men	Women	Age	All	Men	Women
≥25	0.72	0.55	0.94	≥25	0.58	0.41	0.79
25–64	0.73	0.58	0.96	25–64	0.60	0.41	0.81
≥65	0.91	0.86	0.92	≥65	0.77	0.68	0.80

TABLE 12  
*Mean medical expenditure, by income quintile and payer / expenditure type, for people aged 25 or over*

	<i>All</i>	<i>Income quintile</i>				
		Bottom	Second	Third	Fourth	Top
Income	41,671	2,784	14,435	26,397	43,411	92,425
<i>Payers</i>						
Out-of-pocket	888	887	981	858	816	911
Private insurance	2,183	1,881	1,669	1,979	2,392	2,674
Government	1,878	3,094	3,971	1,803	942	630
Medicaid	394	1,221	861	209	60	23
Medicare	1,286	1,565	2,769	1,399	753	504
Other government	198	308	341	195	128	103
<i>Expenditure types</i>						
All	5,123	6,052	6,810	4,867	4,323	4,333
Hospitals	2,204	2,795	3,097	2,183	1,790	1,634
Inpatient	1,713	2,304	2,580	1,708	1,311	1,140
Outpatient	491	491	516	476	479	494
Office-based visits	1,177	1,172	1,306	1,102	1,123	1,196
Prescription drugs	1,129	1,433	1,562	1,053	913	904
Other	613	652	845	528	496	600

*Note:* Adjusted to 2014 dollars.

the same statistics separately for people under and over 65. Similarly to Table 10, we exclude people younger than 25 from this analysis. For the entire sample, out-of-pocket medical spending does not vary significantly by income quintile. However, for people aged 65 or over, there is a positive relationship between income and out-of-pocket spending: people in the bottom quintile spend \$1,237 out-of-pocket, while people in the top quintile spend \$1,715. It should be noted that this is quite different from the relationship between income and *total* medical spending described above, where the low income group spend more than the high income group.<sup>14</sup> Another observation from Tables 12 and 13 is that payments by private insurance are highest for the top income quintiles, while payments by Medicaid are highest for the bottom quintiles. This can be explained by the correlation between income and insurance status described in Section III: Medicaid is a means-tested programme, while private health insurance is mostly available to high-income people. Unlike Medicaid,

<sup>14</sup>De Nardi et al. (this issue), using the MCBS data, also find that for people over 65, medical spending decreases with income while out-of-pocket spending increases with income. De Nardi, French and Jones (2010), using the Asset and Health Dynamics among the Oldest Old (AHEAD) data, document that for people over 70, out-of-pocket medical spending increases with income.

TABLE 13

*Mean medical expenditure, by income quintile and payer / expenditure type, for people aged 25–64 and aged 65 or over*

**Aged 25–64**

	<i>All</i>	<i>Income quintile</i>				
		Bottom	Second	Third	Fourth	Top
Income	44,243	2,426	15,600	28,716	46,072	96,023
<i>Payers</i>						
Out-of-pocket	734	805	693	655	695	809
Private insurance	2,315	2,014	1,857	2,173	2,465	2,750
Government	829	2,159	1,898	519	215	145
Medicaid	397	1,279	917	171	52	23
Medicare	281	596	737	218	77	37
Other government	151	284	244	131	87	85
<i>Expenditure types</i>						
All	4,055	5,190	4,657	3,585	3,537	3,810
Hospitals	1,717	2,388	2,089	1,621	1,405	1,435
Inpatient	1,280	1,926	1,686	1,207	980	965
Outpatient	437	462	402	414	425	470
Office-based visits	985	1,060	952	852	972	1,068
Prescription drugs	892	1,254	1,103	761	732	783
Other	462	488	512	351	429	524

**Aged ≥65**

	<i>All</i>	<i>Income quintile</i>				
		Bottom	Second	Third	Fourth	Top
Income	30,894	4,389	11,814	18,223	30,567	71,688
<i>Payers</i>						
Out-of-pocket	1,534	1,237	1,417	1,554	1,599	1,715
Private insurance	1,628	1,246	1,155	1,523	1,717	2,206
Government	6,274	7,212	7,759	6,730	5,752	4,724
Medicaid	380	970	750	376	108	22
Medicare	5,496	5,828	6,515	5,905	5,245	4,431
Other government	398	414	494	449	400	270
<i>Expenditure types</i>						
All	9,599	9,791	10,439	9,987	9,238	8,864
Hospitals	4,245	4,549	4,855	4,551	4,062	3,523
Inpatient	3,528	3,938	4,190	3,820	3,292	2,768
Outpatient	717	611	665	731	770	755
Office-based visits	1,984	1,659	1,817	1,983	2,035	2,248
Prescription drugs	2,122	2,224	2,272	2,210	2,037	1,952
Other	1,249	1,360	1,495	1,245	1,102	1,142

*Note:* Adjusted to 2014 dollars.

Medicare – another public insurance programme – is an important source of financing medical spending for people aged 65 or over across all income quintiles. Still, the bottom two quintiles receive more payments from Medicare than the top quintiles. This happens partly because people in low quintiles spend more on medical care in general, as described earlier, and partly because private health insurance plays a more important role in financing the health care costs of high-income people.

The bottom panels of Tables 12 and 13 show how different categories of medical spending vary by income quintile. Average spending on hospital care among people in the bottom quintile is about 1.7 times that of people in the top quintile, and this difference comes from spending on inpatient care. Interestingly, for people aged 65 or over, the gap between the high and low income groups in inpatient hospital spending decreases, while outpatient spending generally increases monotonically with income for this age group. Spending on office-based visits varies little by income quintile, while spending on prescription drugs is higher for low-income people.

### 3. The correlation of medical spending over time

Table 14 reports the correlation of total and hospital medical spending over time, disaggregated by age, and Table A2 in the online appendix reports

TABLE 14

*Correlation of medical spending in year  $t$  with medical spending in year  $t+1$ , by age and expenditure type*

Total spending in levels			Total spending in logs		
	$t$	$t+1$		$t$	$t+1$
All	1.00	0.36	All	1.00	0.61
<25	1.00	0.29	<25	1.00	0.40
25–64	1.00	0.35	25–64	1.00	0.57
≥65	1.00	0.32	≥65	1.00	0.58

Hospital spending in levels			Hospital spending in logs		
	$t$	$t+1$		$t$	$t+1$
All	1.00	0.19	All	1.00	0.26
<25	1.00	0.09	<25	1.00	0.16
25–64	1.00	0.20	25–64	1.00	0.23
≥65	1.00	0.15	≥65	1.00	0.26

the correlation disaggregated by gender. Because MEPS has only a two-year panel dimension, we can compute this correlation only between periods  $t$  and  $t+1$ . The correlation is reported for the level of medical spending and for the logs. Since many people have zero medical spending in the data, we bottom-coded medical spending at 10 per cent of the mean when taking the log, i.e. people whose medical spending is below 10 per cent of the mean were assigned a value of medical spending equal to 10 per cent of the mean.

The correlation of medical spending in levels is 0.36 and in logs is 0.61. When measured in logs, the correlation for people under 25 years old is significantly lower than that for other age groups. Hospital spending is less persistent than total medical spending: the correlation is 0.19 in levels and 0.26 in logs.

To better understand the dynamics of medical spending, Table 15 shows the transition matrix between quintiles of the total medical spending distribution between times  $t$  and  $t+1$ . Table A3 in the online appendix displays the same statistics for hospital spending. The persistence of medical spending varies by quintile of the medical spending distribution: for people in the bottom and top quintiles, the probability of staying in the same quintile next period is around 54 per cent, whereas for the middle quintiles, this probability varies from 31 per cent to 36 per cent. In other words, individuals who spend little on health care, as well as those who have already experienced high medical shocks, are more likely to continue this spending pattern for more than one period.<sup>15</sup> This also shows that the overall persistence of medical spending measured as the correlation of total expenditures between two consecutive periods underestimates the risk of having a sequence of large medical shocks experienced by people at the top of the medical spending distribution. High medical spending at the top is often a result of serious chronic diseases that require expensive treatments lasting more than a year. Note that relatively high persistence at the tail of the distribution happens at all ages, but persistence at the bottom becomes higher than that at the top with age.

Figure 1 plots the cumulative distribution functions (CDFs) for two variables: one-year medical spending and medical spending averaged over two years. The two lines are very close, suggesting that medical spending

<sup>15</sup> Monheit (2003), using waves 1996 and 1997 of MEPS, also documents high persistence at the top of the distribution. According to this study, 50.6 per cent of individuals who were among the top 20 per cent of spenders in 1996 are still in the top quintile of the medical spending distribution in 1997. Hirth et al. (2015) document a similar pattern using the MarketScan data set: 43.4 per cent of individuals among the top 10 per cent of spenders in 2003 have retained their position in the distribution one year later, and 34.4 per cent of them have retained this position even five years later.

TABLE 15  
*Transition matrices for total medical expenditure, by age*

**All**

<i>Quintile in current year</i>	<i>Quintile next year</i>				
	Bottom	Second	Third	Fourth	Top
Bottom	53.9	24.9	11.9	5.7	3.6
Second	24.6	34.4	23.8	11.3	5.9
Third	11.9	23.4	31.0	22.5	11.2
Fourth	5.8	11.2	22.2	35.8	25.1
Top	3.8	6.1	11.2	24.7	54.2

**Aged <25**

<i>Quintile in current year</i>	<i>Quintile next year</i>				
	Bottom	Second	Third	Fourth	Top
Bottom	47.0	23.6	13.9	9.0	6.5
Second	22.9	28.8	23.1	15.4	9.8
Third	14.1	22.4	25.7	22.6	15.2
Fourth	9.1	15.1	22.8	28.8	24.2
Top	6.8	10.2	14.5	24.2	44.2

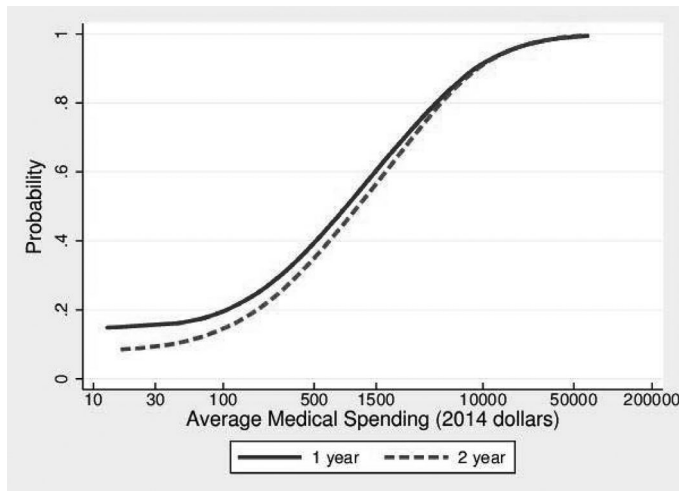
**Aged 25–64**

<i>Quintile in current year</i>	<i>Quintile next year</i>				
	Bottom	Second	Third	Fourth	Top
Bottom	56.5	23.9	10.5	5.4	3.7
Second	23.3	34.4	22.7	12.1	7.5
Third	10.4	22.7	30.9	22.9	13.0
Fourth	5.6	11.4	23.3	34.5	25.2
Top	4.2	7.6	12.6	25.0	50.6

**Aged ≥65**

<i>Quintile in current year</i>	<i>Quintile next year</i>				
	Bottom	Second	Third	Fourth	Top
Bottom	59.0	19.3	9.9	6.4	5.5
Second	20.9	33.8	21.7	13.9	9.7
Third	9.9	24.1	28.9	21.6	15.6
Fourth	6.4	14.4	24.5	30.6	24.2
Top	3.9	8.5	15.0	27.6	45.1

FIGURE 1  
*CDF of total medical expenditure, averaged over one and two years*



is persistent.<sup>16</sup> Figure 2 shows that this is also the case for different age groups and for different types of medical care spending (hospital and non-hospital).

Table 16 reports the Gini coefficient<sup>17</sup> and the share of total medical spending by the top 1 per cent and 10 per cent of spenders. We document these statistics for yearly medical spending and for medical spending averaged over two years. Table 16 also shows how these statistics vary by age and the type of care (hospital and non-hospital). For the entire sample, the Gini coefficients are 0.76 for one- and 0.73 for two-year medical spending.<sup>18</sup> Around 63 per cent of total spending is accounted for by the top 10 per cent of spenders. The concentration decreases with age: for people between 25 and 64 years old, the Gini coefficient is equal to 0.75, whereas for people aged 65 or over, it is 0.63. Similarly, the contribution of the top 10 per cent of spenders to the total is 61.4 per cent for the younger group and 48.9 per cent for the older one. Hospital spending is more concentrated than total spending, with the Gini coefficient equal to 0.93.

<sup>16</sup>The more correlated is the medical spending in years  $t$  and  $t+1$ , the closer together are the CDFs for average medical spending over a two-year period and for one-year medical spending. For example, if autocorrelation is 1, the two lines will be the same.

<sup>17</sup>The Gini coefficient is a measure of inequality. It is generally bounded between 0 and 1, where 0 corresponds to perfect equality and 1 corresponds to maximum inequality.

<sup>18</sup>The fact that the Gini coefficient of medical spending averaged over two years is close to the Gini coefficient of one-year medical spending also indicates high persistence.

FIGURE 2  
*CDF of medical expenditure, averaged over one and two years, by age and by expenditure type*

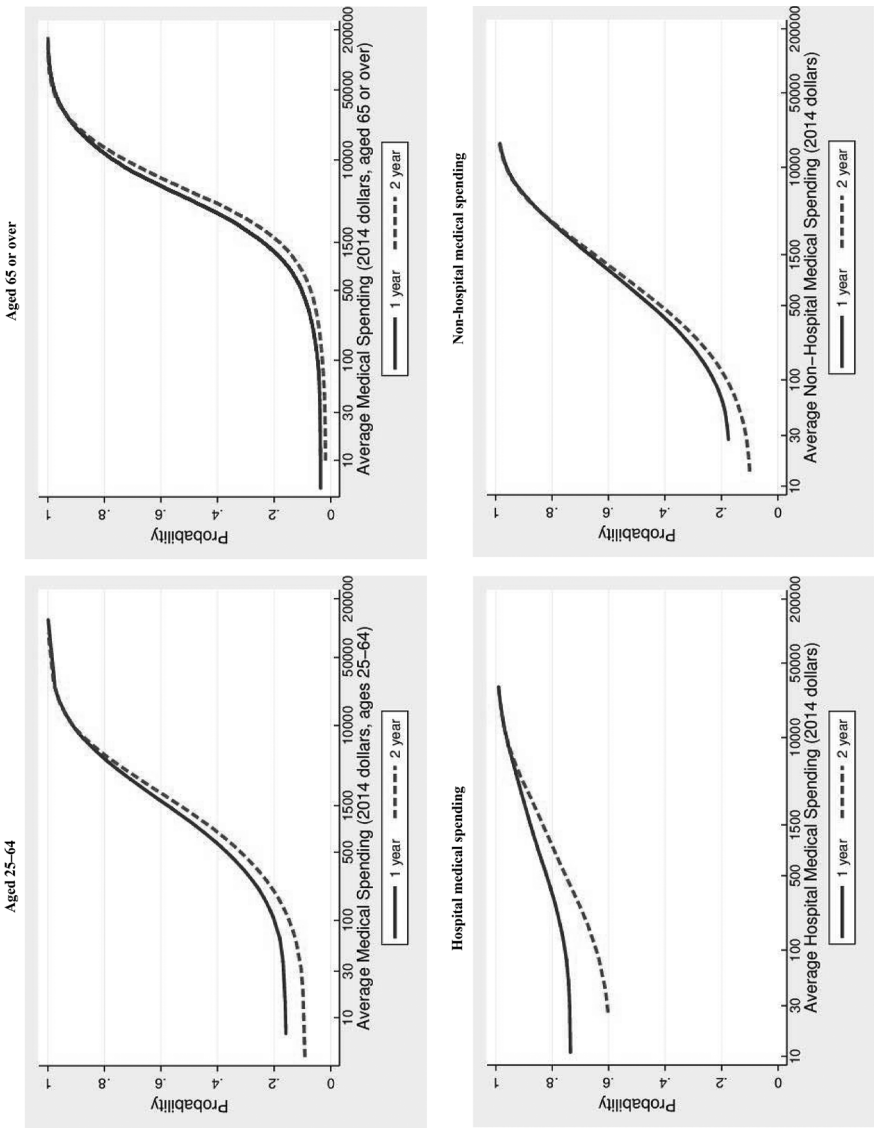




TABLE 16

*Measures of the concentration of medical spending, by age and expenditure type***Over one year**

	<i>All</i>	<i>Aged 25–64</i>	<i>Aged ≥65</i>	<i>Hospital</i>	<i>Non-hospital</i>
Gini coefficient of medical spending	0.76	0.75	0.63	0.93	0.73
Percentage spent by top 1% of spenders	21.5%	21.5%	12.8%	39.7%	17.8%
Percentage spent by top 10% of spenders	62.8%	61.4%	48.9%	92.3%	56.2%

**Over two years**

	<i>All</i>	<i>Aged 25–64</i>	<i>Aged ≥65</i>	<i>Hospital</i>	<i>Non-hospital</i>
Gini coefficient of medical spending	0.73	0.72	0.58	0.90	0.70
Percentage spent by top 1% of spenders	18.2%	18.6%	9.6%	31.3%	15.9%
Percentage spent by top 10% of spenders	58.6%	56.9%	42.9%	83.0%	53.2%

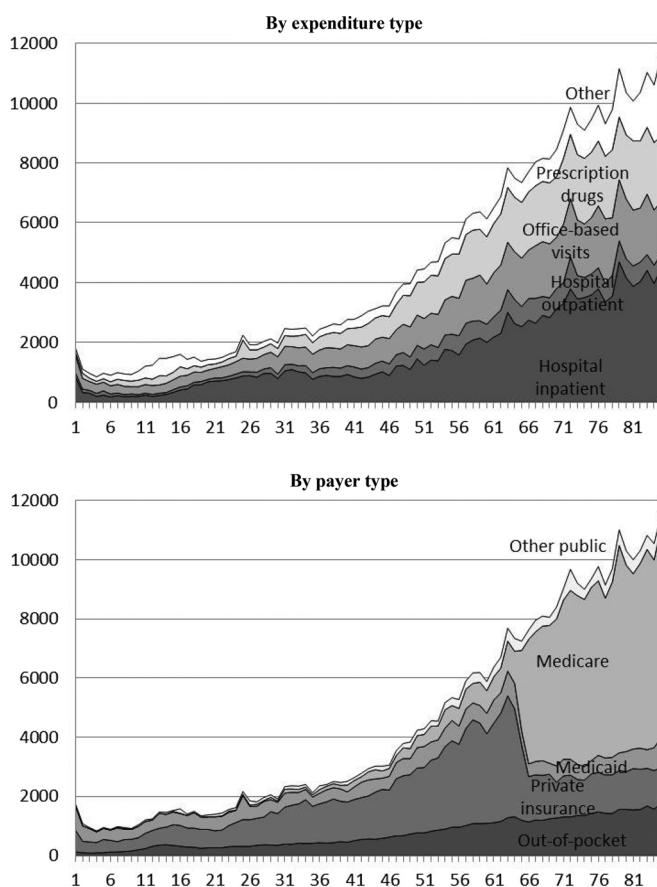
**VI. Average medical spending over the life cycle**

Figure 3 plots the life-cycle profiles of average medical spending disaggregated by type of expenditure (top panel) and payer (bottom panel). All categories of expenditure increase with age, and the growth rate noticeably accelerates from age 50 onward. The highest rate of growth is observed among inpatient hospital spending. The bottom panel shows a large change in the relative role of public and private insurance at age 65: before this age, private insurance is the major source of financing medical spending, whereas afterwards, Medicare is the main source. Spending financed by private insurance or Medicare increases with age over the segments of the life cycle when they serve as major payers, whereas the spending of Medicaid remains relatively stable, primarily due to the absence of nursing home residents in our sample.

**VII. Conclusion**

In this paper, we document micro-level facts about medical spending in the US based on the Medical Expenditure Panel Survey data set. Our main findings are as follows. For the entire population, around 44 per cent of total medical spending is paid by private insurance, but there is a substantial difference by age in terms of financing medical care: for working-age adults (25 to 64 years

FIGURE 3  
Average total medical expenditures over the life cycle



old), private insurance covers around 57 per cent of the total medical spending, whereas for the elderly (aged 65 or over), the largest payer is the government, which covers 65 per cent of the total. Inpatient hospital care accounts for a third of aggregate medical expenditures. Medical spending is highly concentrated: the top 5 per cent of spenders account for more than half of the total expenditure. An even higher concentration is observed with hospital spending, where the top 5 per cent of spenders contribute around 80 per cent of the total expenditure. The concentration in medical spending decreases with age: the Gini coefficient of total medical spending is 0.75 for people between 25 and 64 years old and 0.63 for people aged 65 or over. We find that the average medical spending of people in the bottom income quintile is higher than that of people in the top income quintile for all age groups. In terms of persistence of medical spending,

we find that the correlation of medical expenditure in two consecutive years is 0.36. When persistence is measured by quintile of the medical spending distribution, the medical spending of people in the bottom and top quintiles has higher persistence than that of other groups.

It is important to note that the US health insurance market is currently undergoing significant changes due to the Affordable Care Act, which became effective in 2014. The likely effects of this reform in the near future are an increase in insurance rates, a decrease in out-of-pocket medical spending, and an increase in the share of medical spending covered by Medicaid for those states that choose to expand this programme.

## Supporting information

Additional supporting information may be found in the online version of this paper on the publisher's website:

- Appendix Tables A1, A2 and A3

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