Impact of Medicare Age Eligibility on Health Spending among U.S. and Foreign-Born Adults

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Objective. Examine differences in health care expenditures between foreign-born and U.S.-born adults in late mid-life, and how these differences change after age 65, when Medicare is near-universal.

Data. Medical Expenditures Panel Survey data (2000–2010) on adults ages 55–75 years ($n = 46,132$) to examine annual total and payer-specific expenditures.

Study Design. We use (1) propensity score matching to generate quasi-experimental samples with equivalent health needs and health care preferences, (2) generalized linear modeling to estimate group differences in expenditures, and (3) bootstrapping methods to obtain variance estimates for significance testing.

Principal Findings. Among adults ages 55–64, the foreign-born spend \$3,314 ($p < .001$) less on health care, even when they have equivalent health needs and health care preferences. This difference is due mainly to lower spending through private insurance. After age 65, differences in total spending disappear but not differences in payer-specific spending. The foreign-born continue to spend significantly less through private insurance and begin to spend significantly more through Medicare and Medicaid.

Conclusion. Foreign-born adults in late mid-life spend significantly less on health care than U.S.-born adults. After age 65, with near-universal Medicare coverage, differences in total spending disappear between the groups, although differences in spending by payer persist.

Key Words. Medicare, health expenditures, insurance, immigrant health care, disparities

The United States is undergoing a major change in the demographic composition of older adults, including substantial growth in the proportion who are foreign-born. Recent projections suggest that the share of foreign-born individuals among adults' ages 65+ will rise by 60 percent over the next two dec-

ades, and by 2050 will constitute 23 percent of this population (Armstrong and Ortman 2013).

Research on health care consumption among older immigrants is still incipient (Derose et al. 2009). We lack an understanding of their health spending patterns as well as who pays for their health care. Yet knowledge of these issues is vital for designing appropriate policy to accommodate the ongoing demographic shifts. Of particular interest is what happens to aging immigrants as they cross the threshold for near-universal coverage under Medicare, which occurs at age 65. This study examines this question.

Most health services research on immigrants, hereafter called foreign-born, has focused on either children or nonelderly adults. Research reveals lower health care spending levels among foreign-born individuals relative to those born in the United States (Mohanty et al. 2005; Goldman, Smith, and Sood 2006; Ku 2009; Stimpson, Wilson, and Eschbach 2010; Tarraf, Miranda, and González 2012). Statistics regarding health care spending among foreign-born older adults is nonexistent. A major impediment to research in this area has been that most population-based surveys with data on health care spending lack data on the nativity status of respondents. Medicare lacks information on the immigration status of beneficiaries, and the Medicare Current Beneficiary Survey does not ask about it. The Institute of Medicine's (IOM) 2002 landmark report on disparities devoted little space to discussing disparities among foreign-born individuals (Smedley, Stith, and Nelson 2002), missing the opportunity to direct more research toward this increasingly important minority population in the United States (Lum and Vanderaa 2010).

Our study is the first to provide empirical evidence on how gaining access to Medicare at age 65 affects health care spending among the foreign-born, who are arguably a high needs population (Derose, Escarce, and Lurie 2007; Derose et al. 2009; Prus, Tfaily, and Lin 2010). Research suggests the rate of uninsurance among foreign born adults in late mid-life (ages 50–64) is more than 2.5 times the rate among U.S.-born adults (26.2 percent vs. 10.2 percent, respectively), and even when they have insurance, foreign-born individuals are twice as likely to experience spells without health insurance (Reyes and Hardy 2014). Adults in this age range face an increased risk of mortality,

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disability, and major chronic conditions, such as coronary heart disease (Bhattacharya, Choudhry, and Lakdawalla 2008; Martin et al. 2009, 2010; Crimmins and Beltrán-Sánchez 2011), with heavy financial burdens resulting from this morbidity (Paez, Zhao, and Hwang 2009). Given their socioeconomic and health care access profile, foreign-born adults in late mid-life are a vulnerable segment of the U.S. population.

Previous research has shown that Medicare eligibility is linked to changes in health care consumption. Finkelstein (2007) showed that the introduction of Medicare in 1965 was associated with an increase in aggregate health care spending, and Card, Dobkin, and Maestas (2008) showed that gaining Medicare tends to raise an individual's level of health care consumption. Enhanced access to care under Medicare has also been shown to be associated with reductions in the differences between certain racial/ethnic and socioeconomically disadvantaged groups (Card, Dobkin, and Maestas 2008). However, research has also found that different sources of insurance (e.g., availability of supplemental insurance) among beneficiaries lead to different patterns of consumption (Chen et al. 2005; Doubeni et al. 2009, 2010). Insurance prior to gaining Medicare has also been shown to be associated with health care consumption among beneficiaries (Baker and Sudano 2005; Baker 2006; Baker et al. 2006; Dor, Sudano, and Baker 2006). For example, McWilliams et al. (2009) showed that individuals who were uninsured or had spells without insurance in the years leading up to Medicare eligibility incurred higher health care expenditures after gaining Medicare, compared to those who were continuously insured. Such spending differences were driven by pent-up health care needs due to chronic health conditions and by steeper trajectories of decline in health among uninsured and under-insured adults in late mid-life (Baker et al. 2001, 2006; Baker and Sudano 2005; Baker 2006).

This study compares health care spending between foreign- and U.S.-born adults in late mid-life, and tests whether and how differences in spending change after age 65, when Medicare becomes near-universal. In line with the IOM definition of a health care disparity between two groups, our interest centers on differences in spending between foreign- and U.S.-born adults *that cannot be attributed* to differences in health needs or preferences for health care, that is, the “disparities” in health care spending between these populations (Smedley, Stith, and Nelson 2002). We examine both total spending and spending by payer-source using data from the ongoing Medical Expenditure Panel Survey (MEPS) and National Health Interview Survey (NHIS), which includes MEPS respondents as a subset. We expect Medicare eligibility to reduce but not eliminate disparities in spending between these groups. We

also expect that these reductions will be absorbed by higher publicly financed health care among immigrants, especially through Medicaid.

METHODS

Data

We use data from the MEPS yearly consolidated files, 2000 through 2010. MEPS is a large, nationally representative survey of individuals and their medical providers (doctors, hospitals, pharmacies, etc.) conducted by the Agency for Healthcare Research and Quality (AHRQ). A unique feature of MEPS is that each year's sample is drawn from a subsample of households that participated in the prior year's NHIS, conducted by the National Center for Health Statistics. Since MEPS does not consistently gather nativity information for respondents, we take advantage of this nested sample structure to merge data on nativity from the NHIS whenever it was not present in MEPS. Our data mergers follow specific procedures indicated by AHRQ and use linkage codes created and provided by AHRQ staff. Details of these linkage files are provided elsewhere (Agency for Healthcare Research and Quality 2014). MEPS contains detailed information on health care utilization and expenditures, the respondent's demographic and socioeconomic characteristics, health status, and preferences for health care.

Outcomes

We examine total annual health care expenditures and expenditures by payer, including amounts paid out-of-pocket, by private insurance, by Medicare, and by Medicaid. Expenditures are actual payments to providers, not the amounts asked for or "charged" for services. With each respondent's consent, AHRQ staff verified expenditures by checking the actual payment records of providers seen by each respondent. However, if consent was not granted, expenditures are the respondent's own self-reported information. Prior to analysis all expenditures were converted to inflation-adjusted 2010 dollars using the all-items Consumer Price Index.

Primary Predictor

Our focus is on foreign birth and qualifying for Medicare at age 65. In both MEPS and the NHIS, nativity is self-reported, based on questions probing

whether the respondent was born in the United States. Two age groups, adults ages 55–64 and adults ages 65–75, were generated based on each respondent's reported month and year of birth. These age groups and our choice of a nonelderly comparison group aligns with previous studies examining the effects of Medicare on health care utilization (Lichtenberg 2002; Lichtenberg and Sun 2007; Afendulis et al. 2011; Liu et al. 2011).

Sample

In the 2000–2010 MEPS there are 51,928 observations with an age between 55 and 75 years. We exclude 477 observations that lack nativity information, along with 1,446 observations that correspond to “nonqualifying” immigrants, that is, those who have been in the United States for less than 5 years, which reduces the sample to 50,005 (Fortuny and Chaudry 2011; Ferreira et al. 2012). Previous research confirms that older recent immigrants (i.e., less than 5 years of U.S. residency) are significantly less likely to be insured relative to more established U.S. immigrants (Nam 2008) and might exhibit distinctly different health care use and spending patterns (DuBard and Massing 2007; Barcellos, Goldman, and Smith 2012; Stimpson et al. 2012). Finally, we restrict our analyses to respondents without missing values on any of the study's matching indicators (details below). Our final analytical sample consists of 46,132 observations, which generalize to an average yearly population of 46,118,430 U.S. residing, noninstitutionalized adults, ages 55–75.

Analytic Strategy

We adopt a quasi-experimental design and a difference-in-differences (DD) estimator, contrasting health care expenditures before and after age 65 among foreign-born and U.S.-born adults, and complement this with propensity score matching techniques (Wooldridge 2002; Imbens and Wooldridge 2008). We first report descriptive statistics for our analytic sample by nativity status and age group in Table 1.

To test the DD assumption of equivalent health spending trends among foreign- and U.S.-born adults prior to age 65, we estimate a regression for unadjusted total health care expenditures by nativity status and age (Figure 1), and allow the marginal effect of age on expenditures to differ before and after age 65, assuming there is continuity at the joint, that

Table 1: Descriptive Statistics and Matching Results by Age Groups and Nativity Status. Results are based on data from respondents ages 55–75 years in the Medical Expenditures Panel Survey (2000–2010)

	Prematch		χ^2 -test	Postmatch		Standardized Bias*
	%	%		%	%	
Sociodemographic matching (55–<65 vs. 65–75)	55–<65	65–75		55–<65	65–75	
Gender						
Female	51.4	53.5	$p = .0005$	52.1	53.2	2.1
Poverty						
Poor	8.5	7.9	$p = .0000$	9.8	8.1	6.0
Near poor	2.7	5.3		4.2	4.5	1.7
Low income	9.0	15.6		12.4	14.7	6.7
Middle income	25.9	29.4		29.2	30.1	1.8
High income	53.9	41.8		44.4	42.7	3.5
Education						
Less than high school (HS)	14.6	23.1	$p = .0000$	20.6	21.5	2.2
High school	31.3	33.9		34.3	34.6	0.7
Some college	14.5	13.1		13.5	13.4	0.4
College or more	39.6	29.8		31.6	30.5	2.4
Nativity						
Foreign-born	11.2	9.6	$p = .0002$	9.1	9.8	2.3
Race/ethnicity						
White	78.2	80.8	$p = .0001$	80.9	80.7	0.3
Black	9.6	8.5		9.1	8.4	2.3
Hispanic	7.3	6.5		5.9	6.6	3.1
Other	4.9	4.3		4.2	4.2	0.2
Region						
Northeast	19.0	19.2	$p = .3220$	17.8	18.7	2.2
Midwest	23.0	22.3		22.9	22.3	1.4
South	36.9	38.2		38.4	38.8	0.7
West	21.1	20.4		20.8	20.2	1.6
Metropolitan statistical area (MSA)						
Yes	80.5	78.3	$p = .0027$	78.2	78.3	0.3
	Prematch%		t -test	Postmatch%		Standardized Bias*
	FB	USB		FB	USB	
Health needs and health care preferences matching (foreign- vs. U.S.-born)						
Fair/poor health (yes)	24.7	19.0	$p = .0000$	26.1	20.6	15.9
Angina (yes)	3.7	5.3	$p = .0002$	4.1	5.8	2.5

Continued

Table 1: *Continued*

	<i>Prematch%</i>		<i>t-test</i>	<i>Postmatch%</i>		<i>Standardized Bias*</i>
	<i>FB</i>	<i>USB</i>		<i>FB</i>	<i>USB</i>	
Asthma (yes)	6.5	10.0	$p = .0000$	6.9	10.2	0.5
Coronary heart disease (yes)	6.7	9.1	$p = .0000$	7.8	10.0	2.8
Diabetes (yes)	18.3	15.8	$p = .0006$	19.2	16.8	8.2
High blood pressure (yes)	47.1	52.1	$p = .0000$	49.5	54.0	0.5
Heart disease (yes)	8.0	13.8	$p = .0000$	9.2	14.7	4.8
Stroke (yes)	4.4	5.6	$p = .0032$	5.1	6.3	3.0
Emphysema (yes)	1.2	4.4	$p = .0000$	1.5	4.9	2.6
Joint pain (yes)	40.0	52.8	$p = .0000$	41.6	54.0	6.1
IADL (any)	4.1	4.1	$p = .9403$	5.0	4.5	1.9
ADL (any)	2.2	2.2	$p = .9451$	2.8	2.4	2.8
		<i>Mean</i>	<i>Mean</i>	<i>t-test</i>	<i>Mean</i>	<i>Mean</i>
SF-12 physical (0–100)		46.6	45.7	$p = .0000$	45.7	45.0
SF-12 mental (0–100)		51.0	52.1	$p = .0000$	50.9	52.0
Does not need health insurance (1–5)		1.6	1.4	$p = .0000$	1.5	1.4
Insurance not worth cost (1–5)		2.3	2.0	$p = .0000$	2.2	2.0
Likelihood of taking risks (1–5)		2.2	2.0	$p = .0000$	2.1	2.0
Overcoming illness without medical help (1–5)		1.8	1.8	$p = .024$	1.8	1.8

*Absolute values of standardized bias measuring post matching differences between groups in units of standard deviations, and calculated for both continuous and categorical variables. A value of 10% of lower indicated acceptable balance. Residual imbalances are accounted for using double robust techniques that control for estimated propensity scores in the regression models.

is, at age 65. Prior to age 65 spending trends are equivalent between foreign- and U.S.-born adults.

We use nearest-neighbor propensity score matching (Leuven and Sianesi 2003), and then estimate a generalized linear model (GLM) for health expenditures on matched samples from complex survey data to test whether the difference-in-differences is significantly different from zero (Dugoff, Schuler, and Stuart 2014), and use bootstrapping techniques to enhance our estimated models’ inference validity (Efron and Tibshirani 1986, 1994; Rust and Rao 1996; Yeo, Mantel, and Liu 1999). A detailed discussion of each of these steps follows.

First, we match our samples of foreign- and U.S.-born adults on predisposing demographic and socioeconomic indicators, using nearest-neighbor matching without replacement and a 0.2 standard deviation caliper to match respondents on the logit of their propensity score (Austin 2011; Wang et al. 2013). By matching respondents from the comparison group (adults ages 55–64) to the treatment group (adults ages 65–75), we generate a quasi-

Figure 1: Estimated, Unadjusted, Total Health care Expenditures by Nativity Status and Age

Notes. Results are from unadjusted generalized linear models with a log link using data from respondents ages 55–75 years in the Medical Expenditures Panel Survey (2000–2010).

experimental sample of respondents with equivalent predisposing demographic and socioeconomic characteristics. This allows us to eliminate the effects of systematic differences in age group–specific characteristics. As such, we are able to measure the average difference in health care expenditures net of distributional imbalance in the characteristics of our treatment and control group in terms of their sex, education, income, race/ethnicity, nativity, region, and residence in a metropolitan statistical area.

Second, we implement the IOM's definition of a health care disparity as the *difference between groups that is not attributable to differences in their health needs or health care preferences* (Smedley, Stith, and Nelson 2002; Lê Cook et al. 2010). Specifically, we conduct a secondary nearest-neighbor matching to calibrate the foreign- and U.S.-born samples in terms of their health needs and health care preference characteristics. We account for an exhaustive list of health indicators, including both objective (diagnoses from physicians) and subjective (self-rated) health measures, as well as self-reported functional limitations in activities of daily living (ADL) and/or instrumental ADLs. The objective measures of health cover nine diagnoses: angina, asthma, coronary heart disease,

diabetes, high blood pressure, other heart disease, stroke, emphysema, and joint pain. The subjective measures include a dichotomous indicator gauging overall physical health (excellent/very good/good vs. fair/poor), and two AHRQ-constructed indices measuring overall physical and mental health based on the SF-12 (Ware, Kosinski, and Keller 1996; Ware et al. 2002). We calibrate our two samples with respect to health care preferences using four variables gauging the respondent's views regarding the importance of having health insurance, risk tolerance, and the value of medical treatment in overcoming illness.

To measure the success of these matching procedures and to ensure appropriate distributional balance, we assess the standardized differences (bias) in covariates between foreign- and U.S.-born adults (Austin 2009). Briefly, standardized differences are scale-neutral values that quantify differences between groups in units of standard deviations (Austin 2009). In Table 1 we also report the characteristics of foreign- and U.S.-born adults following propensity-score matching. The variables listed in this table are the ones used in matching. In the last column we report the calculated standardized bias between the matched samples.

After matching the samples we estimate GLM models for health care expenditures to obtain the DD (Wooldridge 2002; Cameron 2005) estimate of the effects of age eligibility for Medicare on expenditure differences between foreign- and U.S.-born adults. These models control for an individual's age and nativity status, as well as the estimated propensity scores to reduce the effects of any residual imbalance not accounted for by matching (Stuart, Rubin, and Osborne 2008). The models use a one-part GLM with a log link, following recommendations by Nichols (2010). The estimated average expenditures (total and payer-specific) are presented in Figure 2. In Table 2 we report estimated changes in expenditures among the foreign-born pre- and postage 65, as well as the differences between foreign- and U.S.-born adults, and the statistical significance of these differences. Finally, Table 3 reports the derived difference-in-differences estimates to quantify the reduction in disparities in health care expenditures after age 65.

All variance estimates for the tests of statistical significance in Tables 2 and 3 are generated using bootstrapping techniques based on 500 replications of the three-step process specified above using Stata software (Efron and Tibshirani 1986, 1994; Rust and Rao 1996; Yeo, Mantel, and Liu 1999; Kolenikov 2010).

Figure 2: Estimated Total and Payer-Specific Health Care Expenditures by Nativity Status and Age Group

Notes. Estimates are based on demographic and socioeconomic age groups and health needs and health care preferences matched nativity groups. Results are from generalized linear model with a log link using data from respondents ages 55–75 years in the Medical Expenditures Panel Survey (2000–2010). The 95% confidence bounds reflect bootstrapped standard errors based on 500 replicate samples.

Sensitivity Analyses

We re-estimated average expenditures in four other ways, each time altering our propensity score specification (Dehejia 2005): (1) adding the number of reported prescription medications to the equation; (2) adding the number of emergency department visits; (3) including interaction terms between limitations in ADLs and Medical Conditions (e.g., heart disease and stroke); and (4) excluding ADLs from the propensity score model. In each case, the estimates were largely similar to what we report. We also re-estimated the models using simulated confounders at multiple levels of severity as measured by the odds ratio (OR) with treatment and OR with outcomes (Nannicini 2007). We reran our matching accounting for these simulated confounders and recalculated the estimated average expenditures by nativity and age groups. The bias at plausible levels of confounding was generally low and unlikely to affect the overall conclusions.

Table 2: Estimated Average Differences in Expenditures (1) between U.S.- and Foreign-Born Respondents within Age Groups, and (2) between Age Groups within U.S.- and Foreign-Born Groups. Estimates are based on demographic and socioeconomic age groups and health needs and health care preferences matched nativity groups. Results are from generalized linear model with a log link using data from respondents ages 55–75 years in the Medical Expenditures Panel Survey (2000–2010)

	<i>A</i> (\$)	<i>SE</i> *	<i>p-value</i> [†]
U.S.B vs. FB [‡]			
Overall expenditures			
USB vs. FB (55–<65)	3,314	622	0.000
USB vs. FB (65–75)	438	377	0.246
Out-of-pocket			
USB vs. FB (55–<65)	514	56	0.000
USB vs. FB (65–75)	520	54	0.000
Private insurance			
USB vs. FB (55–<65)	2,665	617	0.000
USB vs. FB (65–75)	890	164	0.000
Medicare			
USB vs. FB (55–<65)	425	88	0.000
USB vs. FB (65–75)	–534	261	0.041
Medicaid			
USB vs. FB (55–<65)	–272	120	0.023
USB vs. FB (65–75)	–725	41	0.000
Pre vs. post Medicare [§]			
Overall expenditures			
<65 vs. 65+ FB	3,214	140	0.000
<65 vs. 65+ USB	338	604	0.576
Out-of-pocket			
<65 vs. 65+ FB	144	23	0.000
<65 vs. 65+ USB	150	70	0.033
Private insurance			
<65 vs. 65+ FB	–993	94	0.000
<65 vs. 65+ USB	–2,768	554	0.000
Medicare			
<65 vs. 65+ FB	4,133	52	0.000
<65 vs. 65+ USB	3,174	248	0.000
Medicaid			
<65 vs. 65+ FB	19	92	0.838
<65 vs. 65+ USB	–434	78	0.000

*Bootstrapped standard errors based on 500 replicate samples.
[†]*p*-value is based on testing the null hypothesis that the adjusted estimated difference in expenditures between the specified groups is equal to zero.
[‡]Differences in average spending between U.S.- and foreign-born respondents by age group.
[§]Differences in average spending pre- and post-Medicare eligibility by nativity status.

Table 3: Estimated Differences in Differences between U.S.- and Foreign-Born Respondents. Estimates Are Based on Demographic and Socioeconomic Age Groups and Health Needs and Health Care Preferences Matched Nativity Groups. Results are from generalized linear models with a log link using data from respondents ages 55–75 years in the Medical Expenditures Panel Survey (2000–2010)

	$\Delta\text{-in-}\Delta^*$ (\$)	$SE^\dagger$	$p\text{-value}^\ddagger$
Overall expenditures	–2,877	626	.000
Out-of-pocket	+6	75	.935
Private	–1,775	591	.003
Medicare	–959	267	.000
Medicaid	–453	117	.000

* $\Delta\text{-in-}\Delta = (\text{USB, post-Medicare—FB, post-Medicare}) - (\text{USB, pre-Medicare—FB, pre-Medicare})$. For example, overall spending $\Delta\text{-in-}\Delta = \$438 - \$3,314 = -\$2,877$ and indicates that the average difference in spending (i.e., disparity) between U.S.- and foreign-born respondents decreased by \$2,877 in the post-Medicare period.

† Bootstrapped standard errors based on 500 replicate samples.

‡ p -value is based on testing the null hypothesis that the adjusted estimated difference in expenditures between the specified groups is equal to zero.

RESULTS

Descriptive Statistics

Table 1 reports descriptive statistics on variables used in the propensity score matching, both before and after matching, and the calculated standardized bias in each measure postmatch.

Age Group Demographic and Socioeconomic Differences

After age 65 adults were less likely to report having high income, having a college education or better, being foreign-born, or being from a minority racial/ethnic group. The standardized differences between the two age groups ranged from 0.5 to 24.5 percent (Mean = 8 percent, SD = 7.7 percent). The matching procedure reduced the range of bias to between 0.2 and 6.6 percent (Mean = 2.1 percent, SD = 1.7 percent).

Immigrant Group Health Needs and Health Care Preferences Differences

U.S.-born adults were more likely to report diagnoses of angina, asthma, coronary or other heart diseases, stroke, high blood pressure, emphysema,

and joint pain, while foreign-born adults were more likely to report diabetes. On average, U.S.-born adults had higher mental health index scores but slightly lower index scores for physical health. U.S.- and foreign-born adults had similar levels of ADL and IADL functioning. On average, foreign-born adults had lower valuations for insurance need and cost worth, and more often described themselves as risk takers. The two groups were similar in their assessments of the usefulness of medical help to overcome illness. The standardized differences between the two immigrant groups ranged from 0.12 to 26 percent (Mean = 11.8 percent, SD = 7.43 percent). Our matching procedure reduced the range of bias to between 0.5 and 17.9 percent (Mean = 6.9 percent, SD = 6.0 percent). Our matching procedures reduced the percent of variables with an estimated bias of more than 10 percent by 43 percent. To account for any remaining bias due to group differences on the considered characteristics, all subsequent models included the estimated propensity scores used for matching.

Prematching Estimates of Total Expenditures

As noted earlier, the DD assumption of statistical equivalence in the trend lines for U.S.- and foreign-born adults in the years leading up to Medicare eligibility are satisfied, as shown in the first panel of Figure 1 ($p = .725$). More specifically, before adjusting for the effects of health and health care preferences, health expenditures differed substantially between foreign- and U.S.-born adults. The latter group experienced a constant rate of expenditure growth pre- and post-age 65, whereas foreign-born adults display a dramatic increase in spending after age 65. Among adults ages 55–64 the foreign-born have average total expenditures of \$4,232, compared to \$7,475 among the U.S.-born. After age 65 average total expenditures among the foreign-born rises by \$3,413 to \$7,645, whereas among the U.S.-born it rises by \$1,349 to \$8,994, an increase less than half that seen among the foreign-born.

Postmatching Estimates of Effects of Medicare Age Eligibility on Within-Group Changes in Spending (Table 2)

After adjusting for health and health care preferences, foreign-born adults experience a 72 percent (\$3,214) increase in total expenditures post-Medicare eligibility, whereas U.S.-born adults have statistically equivalent total expenditures in both periods. Expenditures paid by private insurance decline for

both foreign- and U.S.-born adults by 54 percent (\$993) and 61 percent (\$2,768), respectively. As expected, expenditures paid by Medicare rise in both groups, but the growth among foreign-born adults (\$4,132, a 15-fold increase) far exceeds growth among U.S.-born adults (\$3,174, a 5-fold increase). Foreign and U.S.-born adults have equivalent increases in out-of-pocket expenditures of \$144 and \$155, respectively. Finally, while expenditures paid by Medicaid post-Medicare eligibility do not change significantly among the foreign-born, the U.S.-born register a \$434 drop.

Postmatching Estimates of Differences in Total Expenditures between Groups (Table 2)

Pre-Medicare eligibility (ages 55–64), U.S.-born adults spend 75 percent more (\$3,314) than foreign-born adults on health care. After gaining access to Medicare, however, total health care expenditures among U.S.-born adults is only 6 percent (\$437; $p = .246$) higher than spending among foreign-born adults. Medicare age qualification reduces disparities in spending between these groups by \$2,876 (Table 3). Most of the reduction is due to changes in private insurance differences, which are reduced by \$1,775, or from \$2,665 pre-Medicare to \$890 under Medicare.

Postmatching Estimates of Differences in Payer-Specific Expenditures between Groups under Medicare

Despite statistically equivalent total expenditures, there are notable significant differences in payer-specific expenditures between foreign- and U.S.-born adults after age 65. First, significant differences in out-of-pocket expenditures between these groups persist, with U.S.-born adults spending \$520 more than foreign-born adults. Second, U.S.-born adults remain twice as likely to report expenditures covered by private insurance. Third, the average amount spent by Medicare post-age 65 is \$534 lower among the U.S.-born. Finally, on average foreign-born adults have expenditures covered by Medicaid that are 4.5 times higher than those reported by U.S.-born adults, a difference of \$724 between the groups.

DISCUSSION

We used data from the Medical Expenditures Panel Survey to examine the effects of Medicare age qualification on health care spending among U.S.- and foreign-born adults aged 55–75 years matched on health needs and health

care preferences indicators. Three key findings emerge. First, nationwide, foreign-born adults, ages 55–64, have significantly lower health care expenditures than U.S.-born adults in this age range, even after adjusting for differences in health needs and health care preferences. Thus, differences in expenditures, which previous researchers attributed to reduced health care access (Fortuny and Chaudry 2011; Ye et al. 2012), clearly persist into late mid-life (Choi 2011; Villa et al. 2012), a critical period for development of chronic conditions and diseases (Bhattacharya, Choudhry, and Lakdawalla 2008; Martin et al. 2009, 2010; Crimmins and Beltrán-Sánchez 2011).

Second, beyond age 65, when Medicare is near-universal, health care expenditures converge for foreign- and U.S.-born adults, once adjustments are made for differences in health needs and health care preferences. In other words, age eligibility to Medicare reduces disparities.

Third, disparities in health care expenditures by payer continue under Medicare between foreign-born and U.S.-born adults. After age 65 U.S.-born adults rely more on private supplements, whereas foreign-born adults rely more on Medicaid as a means to supplement Medicare. Older immigrants may be more likely to qualify for Medicaid (Nam 2012) given their lower income and fewer assets (Cobb-Clark and Hildebrand 2006; Borjas 2009) and reduced access to employer sponsored private insurance (Buchmueller et al. 2007). Generally speaking, older adults with Medicaid typically have it because they receive Supplemental Security Income (SSI) Cash Assistance and meet additional low-income standards, or because they have insufficient resources to pay for health and long-term care expenses they are incurring (Centers for Medicare and Medicaid Services, n.d.; Kaiser Family Foundation 2010).

While at first glance this might appear to suggest foreign-born seniors disproportionately use public resources, it is important to recognize that research indicates that, overall, foreign-born individuals pay more into Medicare than they take out. The same cannot be said for U.S.-born. Recent research suggests immigrants cross-subsidize insurance costs for U.S.-born individuals (Ku 2009), and between 2002 and 2009 they contributed an estimated \$115.2 billion more to the Medicare Trust Fund than they took out (Zallman et al. 2013b). Research has shown that immigrants contribute substantially to taxes. Aside from traditional non-FICA state payroll taxes, these also include property and sales taxes. Recent estimates have shown that even unauthorized immigrants, who are excluded from Medicare and Medicaid for the most part, contribute close to \$12 billion to state and local taxes (Gardner, Johnson, and Wiehe 2015).

Our findings have important policy implications. They suggest that if health insurance in the United States were more universal, it would likely reduce disparities in health care expenditures among immigrants. The Affordable Care Act (ACA) is increasing access to health insurance, especially through Medicaid. Yet it remains to be seen how many immigrants (e.g., low-income immigrants not eligible for Medicaid) will benefit from the ACA, and also how federal and state restrictions on noncitizens and short-term residents (Capps and Fix 2013; Parmet 2013) and continued political and legal challenges to the ACA will affect the level of health care access among group members.

Previous studies have suggested two reasons why foreign-born individuals have lower health care expenditures: They have better health and they have reduced access to services (Goldman, Smith, and Sood 2006; Tarraf, Miranda, and González 2012). According to the first explanation, with better health they need fewer services and hence spend less on health care. According to the second, they are more likely to be uninsured and their income tends to be lower, so they are less able to afford health care, thus leading to lower spending. It is worth noting that rates of uninsurance are also high among immigrants with full-time employment (Carrasquillo, Carrasquillo, and Shea 2000), as they are more likely to work in sectors and companies that do not offer health insurance (Buchmueller et al. 2007). Our findings provide strong evidence for the second explanation. Although differences in health needs might explain part of the difference in expenditures, we have shown that after controlling for this effect, large and significant expenditure differences exist in the decade preceding Medicare age eligibility. Yet we found that postage 65, with near-universal Medicare coverage, health care spending differences based on nativity disappear.

We also uncovered an age gradient in expenditures among foreign-born adults that substantially outpaced that of U.S.-born adults. Spending differences between the foreign- and U.S.-born were significantly larger pre-Medicare eligibility than they were post-Medicare eligibility. This prompts two insights. The first is that gaining Medicare at age 65 gives foreign-born adults greater access to health care compared to younger foreign-born adults, so disparities in spending effectively disappear beyond age 65.

The second relates to the fact that, among the foreign-born there is a dramatic rise in the growth rate of spending that occurs beyond age 65, whereas among the U.S.-born there is no change in the growth rate of spending over the entire age range, 55–75 (Figure 1). A lack of insurance in late mid-life (before age 65) is associated with a higher likelihood of health decline, mortality,

and use of clinical services following access to Medicare (Baker et al. 2001, 2002; McWilliams et al. 2003, 2004; Hadley and Waidmann 2006). Our findings substantiate this work by showing that reduced health care spending among immigrants before age 65 translates into a steeper rise in spending after age 65. The steep increase could result from either an accelerated loss in health advantages as immigrants grow older or from previously unmet health care needs that Medicare enables individuals to fulfill. We expect the ACA may alleviate some of these systemic health and economic burdens as the immigrant population transitions into older age. The ACA is likely to increase health insurance participation among immigrants before qualifying for Medicare. By doing so, expanded coverage can potentially calibrate immigrant health care needs in a critical age period for disease onset and complications from health conditions. Expanded coverage for insurance, for example, can increase immigrants' use of routine care, office-based primary care use, and enhance their use of prescription medications and disease management. Indeed, Hadley argues that positive health externalities, resulting from increased pre-Medicare access to insurance, likely offset the extra spending resulting from insuring the near-old population and advocates "subsidizing coverage," which would be "offset by lower medical spending in years after the age of 65" (Hadley and Waidmann 2006, p. 448). There are, however, several lost opportunities that were not part of the ACA. Chief among them is the extended exclusion of unauthorized immigrants from purchasing insurance on the exchanges, and denying subsidies to immigrants with short-term legal residence.

A major strength of this study was its use of robust statistical techniques to generate quasi-experimental comparison groups. This allowed us to explicitly apply the IOM concept of health care disparities when measuring differences between foreign- and U.S.-born adults. Previous work on health care utilization among immigrants has largely focused on the marginal effect of nativity obtained through regression models with a large number of covariates. This body of research, while descriptively appropriate, does not attempt to accurately quantify health care disparities among immigrants and is usually silent on recognizing and dealing with issues related to an imbalance in the distribution of health needs and other characteristics when comparing foreign-born to U.S.-born adults. Yet, failing to appropriately account for distributional differences can produce misleading inferences and conclusions (McGuire et al. 2006; Duan et al. 2008; Lé Cook et al. 2010). In this article, we used quasi-experimental methods with propensity score matching techniques to examine the effects of a naturally

occurring state, having near-universal Medicare insurance beyond age 65, on spending differences between U.S.- and foreign-born adults. By using propensity score matching we were able to ensure that both groups had similar health needs and health care preference characteristics, and thereby quantify the effects of nativity and age qualification for Medicare.

Limitations

This study has several limitations. First, we used the MEPS for our analysis, and MEPS relies on self-reported health conditions. Foreign-born individuals are less likely to be aware of medical conditions, partly due to their lower access to health care (Barcellos, Goldman, and Smith 2012; Zallman et al. 2013a). This may have affected the results because our matching algorithms relied on self-reported health conditions as well as both subjective indices of physical and mental health and functional limitations. Second, propensity score matching methods are not perfect substitutes for randomized experiments, and they fall short of true randomization that also balances groups on unmeasured characteristics (Smith and Todd 2001, 2005; Brooks and Ohsfeldt 2013; Ali, Groenwold, and Klungel 2014). Quasi-experimental methods, like this study, are unable to account for unmeasurable confounders. Rather, we used propensity score methods to “mimic randomization” specific to two sets of covariates that correspond well with the IOM definition of a health disparity, and to generate synthetic samples of foreign- and U.S.-born adults that were comparable on these measured covariates. As a check on the bias of our estimates, we conducted additional analyses with different specifications for matching criteria (Dehejia 2005; Nannicini 2007), and our conclusions remained robust to these changes. Third, the MEPS reports lower expenditures relative to estimates from the National Health Expenditures and Medicare. Still, MEPS estimates have been shown to be appropriate for studies focused on relative differences, such as ours (Zuvekas 2009, 2011; Hill, Zuvekas, and Zodet 2012). A fourth limitation is our reliance on a series of cross-sectional surveys. If we had had panel data instead, we might have been able to have better control for unobserved confounders. Any characteristics of individuals unmeasurable before age 65 remained unobserved beyond age 65, yet they may have influenced expenditure patterns under Medicare. Still, we believe that our methods are a significant first step until better data become available. MEPS is currently the most comprehensive data source for examining health care expenditures pre- and post-Medicare eligibility. To ensure confidence in our results and reduce potential bias, we used multiple yearly

cross-sections of MEPS to maximize our sample size, and restricted the comparison periods to 10 years before and 10 years after age 65 and ensured, through matching techniques, demographic and socioeconomic homogeneity pre- and postage 65, and an appropriate balance in health needs and preferences among the control and treatment groups. Fifth, we did not distinguish between immigrants with and without U.S. citizenship. Citizenship has important implications for access to and use of health services (Zuckerman, Waidmann, and Lawton 2011; Sommers 2013), and previous work suggests that systematic differences exist in noncitizens' overall health care utilization and health care expenditures relative to the U.S.-born and to a lesser extent foreign-born citizens (Ortega et al. 2007; Tarraf, Miranda, and González 2012; Vargas Bustamante et al. 2012; Stimpson, Wilson, and Su 2013). Finally, despite controlling for regional differences in the models, we estimated that this study does not fully account for the geographic heterogeneity in expenditures that exists in the United States, or the regional migration patterns of some older adults. As such, future work should examine both within-group differences in expenditures among immigrants as well as both within- and across-region geography variations.

CONCLUSION

Near-universal access to health insurance through Medicare reduces disparities in health care spending between foreign-born and U.S.-born adults. If the ACA can increase access to health care among all Americans, it will likely shift health expenditures among foreign-born adults down the age continuum, thereby reducing some of the current pressures on Medicare and Medicaid.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.