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Specialty choice in times of economic crisis: cross-sectional survey of Spanish medical students

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Abstract

Objective. To investigate the determinants of specialty choice among graduating medical students in Spain.

Setting. Since 2008, when Spain entered into a severe, ongoing economic crisis, the percentage of Spanish medical school graduates electing Family and Community Medicine (FCM) has experienced a reversal after more than a decade of decline.

Design. Nationwide cross-sectional survey of all Spanish medical schools in April 2011.

Participants. 978 responding medical students in their last year before graduation.

Main outcome measures. Respondents' preferred specialty in relation to: (1) the probability of obtaining employment; (2) lifestyle and work hours; (3) recognition by patients; (4) prestige among colleagues; (5) opportunity for professional development; (6) annual remuneration; and (7) the proportion of the physician's compensation from private practice.

Results. Job security had the largest impact on specialty preference. Each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% CI, 27.2% – 40.5%). Job security was 4 times as important as compensation from private practice in determining specialty choice (95% CI, 1.7–6.8). We observed considerable heterogeneity in the influence of life style and work hours, with students who preferred such specialties as Cardiovascular Surgery and Obstetrics & Gynecology valuing longer, rather than shorter workdays.

Conclusions. In the midst of an ongoing economic crisis, job security has assumed critical importance as a determinant of specialty preference among Spanish medical students. Public policies that take advantage of the enhanced perceived job security of FCM may help steer medical school graduates into this specialty.

Introduction

During the past two decades, researchers have carried out numerous studies of the determinants of specialty choice.[1-28] While most have been conducted in the United States,[1-13 16 18 19 22 24 26] others have addressed the determinants of specialization in Canada,[14 17 21 23] Australia,[15 25] the United Kingdom,[20 27] and Japan.[28] In view of growing concerns about a shortage of generalists, many studies have focused on the decision to seek a career in primary care,[2 4-6 18 26] family medicine,[14] general practice,[15 20 25] internal medicine,[22 24] and general surgery.[9 13 16 19 23]

An extensive list of factors influencing specialty choice has been considered, including: financial remuneration,[1-6 8-15 17 19 24 25] life style and work hours,[1 2 4-16 19 21-25] prestige among colleagues or the general public,[1-5 9 10 13-15 19 26] mentors and other role models,[1 5 7 15 16 18 19 21 23] the length of the residency training program,[1 3 5 12 13 15 16] the clinical clerkship experience in medical school,[1 5 13 15 16 19 21 22 26] direct patient interaction and continuity of care,[2-4 9 10 13 24 25] debt upon graduation,[5 6 8 13 15 16 22 26] research and teaching opportunities,[2 5 10 14 15 25] potential for career advancement,[13 15] influence of parents, relatives and peers,[4 5 15] malpractice litigation risk,[8 9 15] opportunity to perform procedures or work with new technology,[2 5 15 21 23] intellectual challenge,[7 9] and hospital versus ambulatory orientation.[2 23] Gender differences in the importance of these factors have also been studied.[8 19-21 28] In the one study that considered job security, no significant effect was found.[9]

In the present study, we examine the determinants of specialty choice in Spain while the country remains in the midst of a severe financial crisis that began in late 2007. In a 2011 cross-sectional survey of medical students in their final year before electing a specialty training program, we confirm the importance of such factors as prestige, opportunity for professional

development, and private sector remuneration. But we also find that job security has assumed a key role in determining specialty preference.

Spain's Healthcare System and the Financial Crisis

The Spanish healthcare system is dominated by the public sector. In 2009, total healthcare expenditures constituted 9.5% of GDP, of which only 2.5% was privately financed. The vast majority of physicians are employees of the public sector, where salaries are fixed by separate negotiations between unions of healthcare workers and the governments of each of Spain's 17 autonomous communities. Physicians in many specialties have opportunities to earn additional income in the private sector, either in their own consultancies or via on-call coverage (termed guardias) at private hospitals. However, such opportunities are not available for specialists in Family and Community Medicine (FCM), who work almost exclusively as full-time employees of health centers.

Medical specialization in Spain is governed by a system widely known as MIR, which stands for Médico Interno Residente, literally "resident medical intern."[29 30] On an annual basis, the central government's Ministry of Health authorizes post-graduate training programs in 47 different specialties, imposing limits on the number of positions (plazas) in each program. Each medical school graduate (candidato) seeking a training position is ranked on the basis of his academic transcript and his score on the annual nationwide MIR examination. In a sequential process, the top-ranked applicant first chooses from all available training programs, after which each successively ranked candidate is permitted to choose from the remaining available training slots. In the 2011 MIR cycle, for example, the Ministry of Health authorized 6,881 positions in

560 training centers throughout the country.[31] A total of 6,873 applicants accepted training positions through the sequential selection process.

Unemployment among graduates of Spanish medical schools was a relatively rare phenomenon until the financial crisis erupted in late 2007. The healthcare sector was not immune from increasingly severe governmental budgetary cutbacks in the ensuing years. By February 2010, the number of laid off physicians nationwide had for the first time crossed the psychological threshold of 1,000.[32] In the spring of 2011, when the survey described in this report was in the field, there were prominent headlines about personnel cuts in the health budgets of many autonomous communities, notably Catalonia.[33] By April 2012, with increasing austerity measures, the number of unemployed physicians had broken the 2,000 barrier.[34]

There is presumptive evidence that the financial crisis has had a significant effect on the career choices of recent medical school graduates. As Figure 1 indicates, the percentage of candidates participating in the annual MIR selection process who elected a training position in Family and Community Medicine underwent an abrupt reversal after 2008. For the past three years (2010–2012), the number of candidates electing FCM has been limited by the number of available training positions, whereas during 2006–2009, some training positions in FCM remained unfilled.

Subjects and Methods

Cross-sectional survey

In April 2011, with the assistance of professors, deans and student associations, we invited all students in their final year in each of the 27 medical schools of Spain to participate in a survey of career preferences. Out of a total population of 3,874 registered sixth-year medical students

nationwide, we received 978 responses (or 25%). With the exception of students at the University of Las Palmas de Gran Canaria, who took the electronic survey as a classroom-based pilot, all respondents completed the survey online. The response rate varied among medical schools, but there were no significant differences in the gender or age composition of the respondents and the entire nationwide population (survey respondents: 71% female, mean age 24.1 years; nationwide population of sixth-year students: 71% female, mean age 24.7 years). Participation in the survey was voluntary, and anonymity was assured. A brief description of the survey methods, along with some preliminary tabulations, have been reported elsewhere.[29]

Survey questionnaire

The electronic survey questionnaire contained three blocks: (1) personal data (age, sex, nationality, residential postal code, university, anticipated date of graduation, and how many parents or grandparents were physicians); (2) questions eliciting preferences among the 47 specialties in Spain's MIR system of postgraduate training; and (3) questions eliciting perceptions and expectations concerning these specialties.

In the second block, in particular, each student was first asked to designate his *preferred specialty*, that is, which specialty he would choose in the annual MIR selection process if he faced no restrictions as a result of his academic performance or his score on the nationwide exam. Each student was then asked to designate his *favorite specialty*, that is, which specialty he enjoyed the most, without regard to remuneration or working conditions ("Sin tener en cuenta los aspectos económicos, condiciones laborales, etc., ¿cuál es la especialidad que más te gusta?"). Among the 978 medical students responding to the survey, 892 (91.2%) designated a preferred specialty, of whom 836 (93.7%) also designated a favorite specialty.

In the third block, each student was presented with seven questions concerning each specialty within a limited menu of six specialties. The menu included the preferred specialty he had just chosen in the second block, the specialty of Family and Community Medicine, and four other specialties chosen at random from four balanced subsets. Each subset contained medical, surgical and diagnostic specialties, with one specialty in each quartile of the global ranking of specialties observed in the MIR 2010 selection cycle.[29]

The seven questions addressed the following attributes of each specialty: (1) the probability of obtaining employment; (2) lifestyle and work hours; (3) recognition by patients; (4) prestige among colleagues; (5) opportunity for professional development; (6) annual remuneration for a physician with 10–15 years experience; and (7) the proportion of the physician's compensation from private practice. Four of the attributes (2, 3, 4 and 5) were measured on a 10-point scale, while two (1 and 7) were gauged on a percentage scale from 0 to 100. The remaining attribute (6) was measured in thousands of euros. The translated text of each question, along the corresponding sample means and standard deviations of students' responses for FCM and for all remaining specialties combined, are given in Table 2. For all seven attributes, the differences in the mean ratings between FCM and other specialties combined were statistically significant ($P < 0.001$).

Statistical methods

We employed the mixed multinomial logit model[35] to assess the influence of each of the seven attributes on students' choice of preferred specialty. The mixed multinomial logit model differs from the standard multinomial logit model in that the coefficients of each predictor variable may vary randomly in the population. In the context of discrete choice modeling, the mixed

multinomial logit model captures the potential heterogeneity of individual preferences. For example, in the case of attribute 2, the mixed model admits the possibility that some students prefer a specialty with reduced work hours and a comfortable life style, while others prefer a specialty with long work hours and little leisure time.

In our application of the mixed multinomial logit model, the observations corresponded to the six specialties within the menus evaluated by each of the student respondents. For each student, the dependent variable was a binary indicator equal to 1 for the preferred specialty and 0 for the remaining five specialties in the student's menu. The independent variables were each student's valuations of the seven attributes. In addition, we included interaction terms between each of the seven attributes and each personal characteristic in order to test whether the coefficients of the attributes differed by sex, age, university, expected graduation date, or the presence of physicians in the family. We also tested interactions between each attribute and a binary variable indicating concordance between the student's preferred and favorite specialty.

Adhering to the mixed logit specification, we further assumed that the coefficients of each attribute were normally distributed in the population with unknown mean and standard deviation. To assess whether there was significant heterogeneity in the coefficients of each attribute, apart from those differences attributable to the foregoing observed personal characteristics, we tested the null hypothesis that the estimated standard deviation of each coefficient's population distribution was equal to zero. We employed the chi-squared test based on the log likelihood ratio to assess the overall model goodness of fit.

To estimate our mixed multinomial logit model, we relied on the *mixlogit* routine in Stata 11 statistical software.[36] Each raw coefficient outputted by this routine corresponds to the effect of a unit change in each attribute on the logarithm of the odds of preferring a specialty. Each raw

coefficient can also be interpreted as the contribution of a unit change in each attribute to the "utility" of the specialty. In the tabulated results below, we report the exponentiated values of the raw coefficients, that is, the effect of a unit change on the odds of specialty preference. However, we used the raw coefficients to assess the quantitative tradeoffs between attributes. For example, to estimate the percentage increase in the proportion of the physician's compensation from private practice (attribute 7) that would yield the same utility as a 1-percent increase in the probability of obtaining employment (attribute 1), we computed the ratio of the raw coefficient of attribute 1 to the raw coefficient of attribute 7.

Finally, to assess the external validity of our mixed multinomial logit model, we compared its predictions of specialty choice with the global ranking of specialties observed among the same nationwide cohort of medical graduates in the 2012 MIR selection process. We chose the 2012 MIR cycle for comparison because the students responding to our April 2011 survey subsequently graduated from medical school in June 2011, then studied for and took the MIR exam in January 2012, and then made their specialty selections during March of that year. Specifically, for each specialty within each student's menu, we computed the predicted probability that the student would prefer that specialty. For each specialty, we then compared its median predicted probability, as derived from our model, with its median ranking among all candidates who elected a specialty in the 2012 MIR cycle.

Results

Predictors of Specialty Preference

Table 2 gives the principal results of our regression analyses. Model 1 represents the standard multinomial logit regression, in which all attribute coefficients are fixed, while Models 2 through

4 represent mixed multinomial logit regressions. In Model 2, in particular, the coefficient of attribute 2 (lifestyle and work hours) is permitted to vary within the population. In Model 3, interaction terms with attribute 6 (annual remuneration with 10–15 years' experience) are included as explanatory variables. In Model 4, attribute 6 and its interactions are removed altogether.

In all model specifications in Table 2, attribute 1 (the probability of obtaining employment) significantly influenced specialty preference. In Model 4, for example, each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% confidence interval (CI), 27.2% – 40.5%). The magnitude of the effect was comparable to that of attribute 5 (professional development, including the possibility of promotion). Attributes 3 (recognition by patients) and 4 (prestige among colleagues) had smaller but significantly positive influences on specialty choice. For both attributes, a 1-point increment on a 10-point scale increased the odds of preferring a specialty by approximately 10–11 percent.

Heterogeneity of Preferences for Life Style and Work Hours

Although attribute 2 (life style and work hours) appeared to have a significant negative influence on specialty choice, our mixed multinomial logit Models 2, 3 and 4 revealed considerable population heterogeneity in this effect. In Model 4, for example, the population average effect was 0.907, with a 1-standard deviation range from 0.606 to 1.208 (that is, 0.907 ± 0.301). Equivalently, a 1-point increment on a 10-point scale reduced the odds of preferring a specialty *on average* by an estimated 9.3 percent. However, for 68 percent of the students (which corresponds to the 1-standard deviation range for a normal distribution), the effect of a 1-point

increment ranged from a 39.4 percent decrease to a 20.8 percent increase in the odds of preferring a specialty. Attribute 2 was the only explanatory variable to show significant population heterogeneity in our mixed multinomial logit regressions.

Figure 2 offers a visual representation of the population heterogeneity in the influence of lifestyle and work hours. To construct the figure, we used the results of Model 4 to compute the predicted effect for each individual student of a 1-point increment in attribute 2. Each open point in the figure represents one student. The points are arranged in rows corresponding to the student's preferred specialty. The horizontal axis gauges the predicted effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours. The solid blue squares represent the population mean effect for each preferred specialty. Among the 887 students included in Model 4, a total of 231 (or 26 percent) had a positive predicted effect of lifestyle and work hours on specialty preference.

Figure 2 displays considerable heterogeneity between preferred specialties. For example, among the group of 53 students preferring Dermatology, whose predicted effects are arrayed in the second row in Figure 2, the average effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours was a 7.6-percent increase in the odds of preferring that specialty. Within this group, the predicted effect ranged from a 12.5-percent decrease to a 29.9-percent increase. For the 35 students preferring Family and Community Medicine, arrayed on the third row, the average effect of a 1-point increment along the scale of lifestyle and work hours was a 4.1-percent increase in the odds of specialty preference, with a predicted effect ranging from a 26.4-percent decrease to a 33.6-percent increase. By contrast, among the group of 73 students preferring Obstetrics & Gynecology, whose predicted effects are arrayed in the next-to-last row of the figure, the average effect of a 1-point increment was an 18.5 percent decrease in

the odds of preferring that specialty. Within this group, the predicted effect ranged from a 34.6-percent decrease to a 13.7-percent increase.

Concordance between Preferred and Favorite Specialties

Among the 892 students who reported both a preferred and a favorite specialty, we observed a concordance between the two responses in 676 students (or 75.8%). Figure 3 shows the rate of concordance, classified by preferred specialty. The rate of concordance ranged from a low of 53.8 percent among students who preferred Cardiovascular Surgery to 90.9 percent among those who preferred Intensive Care Medicine. The rate of concordance for Family and Community Medicine was 85.7 percent.

Opportunities for Private Sector Remuneration

In Models 1 and 2 in Table 2, attribute 6 (annual remuneration with 10–15 years experience) had a significant negative influence on specialty preference, while attribute 7 (proportion of compensation from private practice) had a significant positive effect. To address the apparent inconsistency between the estimated effects of the two different attributes, we included interaction terms with attribute 6 in our specification of Model 3. We found that the negative relation between annual remuneration and specialty preference remained statistically significant for female students and for those who reported a concordance of preferred and favorite specialty. There was no relationship between the effect of annual remuneration and a student's age.

Finally, in Model 4, when we dropped attribute 6 altogether, the effect of attribute 7 remained significant and positive, but its magnitude was decreased. With annual remuneration included as an explanatory variable, each 10-percent increment in the proportion of

compensation from private practice increased the odds of preferring a specialty by approximately 20–22 percent. With annual remuneration excluded, the effect of 10-percent increment in the proportion of compensation from private practice compensation increased the odds of specialty preference by only 7 percent.

Tradeoff between Job Security and Opportunities for Private Sector Remuneration

We focused specifically on the quantitative tradeoff between job security (attribute 1) and opportunities for private sector remuneration (attribute 7). Relying on the results of Model 4, we found that the raw coefficients of attributes 1 and 7 were, respectively, 0.290 (95% CI, 0.241−0.340) and 0.069 (95% CI, 0.028−0.110). The percentage increase in the proportion of the physician′s compensation from private practice (attribute 7) that would yield the same utility as a 1-percent increase in the probability of obtaining employment (attribute 1) was therefore $0.290 \bullet 0.069 = 4.2$. Based on a linear approximation of the variance of the ratio of two random variables, we computed the 95% confidence interval around this estimate as 1.7−6.8.

External Validity: Comparison with MIR 2012 Global Rankings

For all four models, the chi-squared statistic based on the log likelihood ratio showed a significant goodness of fit ($P < 0.002$). As a further check of internal validity, we found a close match between the observed and predicted probabilities of specialty choice when broken down by decile of predicted probability.[37]

Figure 4 displays a check of external validity. For each specialty, the figure plots median predicted probability of specialty preference against the median specialty ranking in the 2012 MIR cycle. The latter variable is plotted on a reverse scale since the most preferred specialties in

the MIR selection process will have the lowest ranking numbers. Also plotted is the ordinary least squares regression line relating the two variables. The Spearman rank correlation between the two variables was –0.88 and highly significant ($P < 0.0001$).

The strong correlation between the model predictions and the MIR rankings can be seen through a comparison of Cardiology at the upper right, Anesthesiology near the center, and Family and Community Medicine (FCM) near the bottom left. Thus, among the 6,704 candidates nationwide who elected a specialty during the 2012 MIR selection process, the median ranking of those candidates choosing Cardiology was 555. (Only two specialties had a higher median ranking: Plastic Surgery at 136, and Dermatology at 404.) From a menu of six specialties offered to students participating in our survey, the median predicted probability of preferring Cardiology was 29.6 percent. For Anesthesiology, by contrast, the median ranking in the 2012 MIR cycle was 2,652, while the median predicted probability among survey respondents was 16.3 percent. For Family and Community Medicine, the median ranking in the 2012 MIR cycle was 5,552, while the median predicted probability among survey respondents was 9.2 percent.

Discussion

In a cross-sectional survey of medical students in their final year before graduation, conducted in the midst of Spain's economic crisis, we found that job security had significant impact on the specialty preference. Based upon our Model 4 specification, we found that each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% CI, 27.2% – 40.5%). Moreover, we observed considerable variability in the effect of lifestyle and work hours on students' specialty preferences. Among students who would elect Dermatology if there were no restrictions on specialty choice, the average effect of a 1-

point increment a 10-point scale of favorable lifestyle and work hours was a 7.6-percent increase in the odds of preferring that specialty. By contrast, among students preferring Obstetrics & Gynecology, the average effect of a 1-point increment was an 18.5 percent decrease in the odds of preferring that specialty.

We also asked students to designate their favorite specialty, that is, the specialty that they enjoyed the most, independent of future remuneration or working conditions. The concordance between students' preferred and favorite specialties varied considerably. Approximately 54 percent of students who preferred Cardiovascular Surgery also designated it as their favorite specialty. By contrast, approximately 86 percent of students who preferred Family and Community Medicine also designated it as their favorite specialty, while 91 percent of students who preferred Intensive Care Medicine also designated it as their favorite specialty.

Our survey included two attributes that reflected different aspects of physician compensation: the average remuneration of a physician with 10–15 years experience, and the proportion of compensation from private practice. We found that the former had an unexpectedly negative relation to specialty preference, particularly among female students and those favorite specialty matched their preferred specialty, while the latter had a significant positive relation to specialty preference (Model 3). Eliminating the former from our regression analysis (Model 4), we estimated the tradeoff between job security and opportunities for private practice. An increase of approximately 4 percent in the proportion of the physician's compensation from private practice would yield the same utility as a 1-percent increase in the probability of obtaining employment.

Finally, as an external validity check, we found a high correlation between the specialty ranking predicted by our mixed multinomial logit model with the nationwide specialty ranking in

the 2012 MIR selection process. In particular, the median probability that a student would select Family & Community Medicine out of a menu of six specialty choices was approximately 9 percent, while the median MIR ranking of this specialty was 5,552 out of 6,704 candidates.

Study Limitations

Our study has a number of important limitations. To begin with, we surveyed students only once in April 2011. We have no data from a comparable cross-sectional survey carried out before the onset of Spain's economic crisis in late 2007. Further confirmation of the lasting importance of job security in specialty choice will require repeat surveys once employment prospects for physicians have improved.

Nor do we report longitudinal follow-up data on the evolution of our respondents' specialty preferences over time. There is evidence from longitudinal studies that students' specialty preferences evolve during medical school.[38 39] In a study of internal medicine residents in the United States, 62 percent changed the subspecialty career choice at least once during residency.[40] In a longitudinal follow-up of U.K. medical graduates 10 years after graduation, approximately one-quarter were working in a specialty different from that chosen 3 years after graduation.[27] It is notable, however, that 91.2% of students that we surveyed reported a preferred specialty, whereas in the United Kingdom, 28% of medical school graduates in the 1990s knew their preferred specialty one year after graduation.[27] The high correlation between specialty choice predicted by our model and specialty choices observed in the MIR 2012 cycle (Figure 3) does not suggest a marked shift in preferences during the one-year period after medical school graduation, during which prospective candidates study for the national exam and then participate in the sequential selection process.

The explanatory variables in our model (Table 1) were derived from students' perceptions and expectations, rather than objective data. It is entirely possible, for example, that students exaggerated the importance of job security (attribute 1). By April 2012, with Spain's overall unemployment rate hovering around 25%, the psychologically menacing figure of 2,000 unemployed doctors[41] still represented only 1 percent of the active physician workforce. While a few studies have correlated specialty preferences with objective data on remuneration, work hours, malpractice risk, and debt upon graduation,[8 12] we stress that students' subjective perceptions and expectations are the principal determinants of specialty choice.

While a number of studies have focused on the "controllable lifestyle" as an important determinant of specialty choice,[1 2 4-16 19 21-25] our results shed new light on the heterogeneity of preferences for lifestyle and work hours. We find, in fact, that only 26 percent of respondents placed a positive value on reduced work hours, while 74 percent placed a positive value on working more (Figure 2). One possible explanation is that, in a healthcare system where public-sector salaries are fixed by collective bargaining, taking on additional on-call assignments after regular working hours is viewed primarily as a means of increasing remuneration. In the EuroStat Labor Force Surveys, Spanish physicians reported working an average of 39 hours per week,[42] even though the collectively agreed-upon formal work week was 35 hours.

Our failure to find a significant positive effect of annual remuneration (attribute 6) may reflect students' inadequate knowledge of physicians' salaries, a phenomenon that has also been observed in the U.S.[43] It is possible that students' estimates of remuneration were overly influenced by short-term concerns about job security, even though the underlying question was framed over a 10–15 year horizon. Nationally representative data on the earnings of Spanish physicians have not been published. Students' estimates of the annual remuneration of a non-

FCM specialist were on average 44% greater than that of a practitioner of FCM (Table 1), a value that falls within the range of specialist-GP remuneration ratios of other OECD countries.[44]

In Canada, physicians' fee-for-service payments correlate strongly with income,[17] whereas in the United Kingdom, opportunities for non-NHS consultant work constitute an important determinant of variations in income.[45] Our finding that attribute 7 was a significant predictor of specialty choice indicates that, in Spain's healthcare system where publicly financed salaries are the dominant form of physician compensation, opportunities for additional private-sector employment are a more sensitive proxy for physician income. For this reason, we based our calculations of the tradeoff between job security and remuneration on the results of Model 4, which excludes attribute 6 entirely.

A few studies have employed a discrete choice experiment – rather than a cross-sectional survey – to assess the determinants of physicians' choice of specialty,[25] working conditions,[45 46] and urban versus rural practice.[47] A discrete choice experiment has the advantage that each potential determinant of physician choice can be independently controlled and varied randomly. In principle, such a study design might have helped us distinguish more precisely between total remuneration (attribute 6) and opportunities for private sector employment (attribute 7). It might also have allowed us to assess more precisely the extent to which the "workaholics" in our study, who preferred specialties with more working hours (attribute 2), would trade off higher income for reduced leisure time. One drawback of the discrete choice experimental design is that respondents choose between hypothetical choices constructed by the experimenter, whereas in our cross-sectional study, we directly observe the perceived attributes of the actual specialty options available to graduating medical students. While the results of discrete choice

experiments can be used in simulations, our cross-sectional design thus facilitates external validation of our results (Figure 4).

We asked students to report both their preferred and favorite specialties, a distinction we have not encountered in any other study. While Spanish medical students generally report a high level of concordance between the two (76%), we observed considerable variation by preferred specialty (Figure 2). It is noteworthy that five of the highest ranked specialties in the 2011 MIR cycle (Cardiovascular Surgery, Neurosurgery, Plastic Surgery, Cardiology and Dermatology; see Figure 4) had low levels of concordance. By contrast, the observed high levels of concordance for Internal Medicine and Family and Community Medicine suggest that students who prefer these specialties do so despite the low salaries, minimal opportunities for private-sector remuneration, or unfavorable working conditions. This conclusion is further supported by the observed negative effect of the interaction between concordance and remuneration in Model 3 (Table 2).

Policy Implications

Increased remuneration, more favorable working conditions and enhanced prestige have routinely been proposed as incentives to lure medical students into primary care and family practice. In Spain, however, physician remuneration within the public sector is determined by decentralized collective bargaining between unions and local governments. Opportunities for primary care and family practice physicians to earn additional income in the private sector are scarce and even less under the control of the central government. Improvements in working conditions and enhancement of prestige are longer-term solutions that will require reformulation of the nature of work of the primary care physician and the role of community health centers.[29 30]

Our findings, by contrast, suggest other shorter-term policy levers that may take advantage of the high level of perceived job security of FCM (Table 1) and thus increase the flow of medical school graduates into the field. To the extent that the healthcare budgets of the country's 17 autonomous communities must continue to endure budgetary cuts, our results argue for sparing community health centers and the practitioners of FCM who work in them. As part of its crisis management, the Spanish central government has recently increased physicians' legal work week from 35 to 37.5 hours, a measure that has sparked more than a few protests.[48 49] Ironically, this measure will cut mostly into the incomes of non-FCM specialists who earned additional income through after-hours guardias and thus reduce the income disparity with family physicians.

As a separate policy instrument, the central government's Ministry of Health could cautiously expand the number of approved post-graduate training positions in FCM, which has recently become a limiting factor in the resurgence of this specialty since 2008 (Figure 1). There is evidence that many residents already in training in FCM have chosen to retake the national MIR exam and reenter the selection process as candidatos despite the requirement that they abandon their current training position.[29] It is conceivable that too large an excess of unfilled training slots in FCM could aggravate this perverse incentive.

Conclusions

In the midst of an ongoing economic crisis, job security has assumed critical importance as a determinant of specialty preference among Spanish medical students. Public policies that take advantage of the enhanced perceived job security of FCM may be an effective way to steer medical school graduates into this specialty.

Footnotes

Contributors

All authors (JEH, BGL, VOR, PBP) contributed substantially to the conceptualization and design of the survey. JEH, BGL and PBP performed statistical analyses on the survey data. JEH and BGL wrote the initial drafts, while VOR and PBP made substantive changes to various drafts. All contributors approved the final version for publication.

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Competing Interests

All authors have completed the United Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that they have no competing interests.

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Statement concerning Ethical Approval

No ethical approval was required for this research.

Data Sharing Statement

The detailed results of all statistical analyses, including statistical code, are available from the corresponding author at jeffrey@mit.edu.

Article Summary

Article focus.

- Ours is the first study of the determinants of physician specialty choice in Spain, a country whose healthcare system is dominated by the public sector.
- Since 2008, when Spain entered into a severe, ongoing economic crisis, the percentage of Spanish medical school graduates electing Family and Community Medicine (FCM) has experienced a reversal after more than a decade of decline.
- In an April 2011 nationwide cross-sectional survey of graduating students from all Spanish medical schools, we focus on job security as a determinant of physician specialty choice.

Key messages.

- We find that job security has assumed a key role in determining specialty choice.
- We confirm the importance of such factors as prestige, opportunity for professional development, and private sector remuneration.
- In contrast to prior studies, we find wide variation in the importance that Spanish medical students attach to a controllable life style and reduced work hours.

Strengths and limitations of this study.

- Our findings suggest policy levers that may take advantage of the high level of perceived job security of Family and Community Medicine and thus increase the flow of medical school graduates into the field.
- In the present study, we do not report longitudinal follow-up data on our respondents' specialty preferences over time.

Table 1. Seven survey questions on attributes of medical specialties [a]

	Attribute and Survey Text	FCM Mean *S.D.*	All Others Mean *S.D.*
1	*Probability of Obtaining Employment.* "How would you rate the probability of obtaining work in the next three years, whether in the public or private sector, for an individual who became certified in this specialty today? (0 to 100 percent)"	83.98 *19.89*	64.78 *23.92*
2	*Lifestyle & Work Hours.* "Work hours, working conditions, and the ability to reconcile work with family life. (0 to 10, 0 = very bad, 10 = very good)"	7.78 *2.09*	6.78 *2.25*
3	*Recognition by Patients.* "Recognition of professional work on the part of patients. (0 to 10)"	5.92 *2.60*	6.34 *2.73*
4	*Prestige among Colleagues.* "Prestige and recognition among colleagues as well as social recognition. (0 to 10)"	3.92 *2.28*	6.30 *2.52*
5	*Opportunity for Professional Development.* "Possibility of promotion or future professional development within the specialty (new fields, new techniques, scientific advances). (0 to 10)"	5.11 *2.30*	7.20 *2.15*
6	*Annual Remuneration with 10–15 Years Experience.* "Estimate the current average annual gross remuneration (public and private combined) of a specialist with 10–15 years of experience. (Thousands of euros)" [b]	60.00 *0.16*	86.56 *31.96*
7	*Proportion of Compensation from Private Practice.* "What percentage of this remuneration (including public and private) do you believe comes from private practice? (0 to 100 percent)" [b]	0.00 *0.00*	39.32 *23.40*

a. The introductory text was, "In this section, you'll define your profile of some medical specialties, including the one that you've just chosen as your first choice as well as others chosen at random. Think about your *perceptions and expectations* concerning each specialty."

b. The preamble to the two questions on attributes 6 and 7 was: "The following questions are about compensation. To facilitate your responses, recall that the average annual gross income of a full-time specialist in Family & Community Medicine with 10–15 years experience is currently about 60,000 euros."

Table 2. Mixed Multinomial Logit Regression Results [a]

Explanatory Variable	Model 1	Model 2	Model 3	Model 4
1. *Probability of Obtaining Employment* [b]	1.324 [1.263 , 1.388]	1.346 [1.278 , 1.418]	1.339 [1.271 , 1.412]	1.337 [1.272 , 1.405]
2. *Lifestyle & Work Hours*	0.905 [0.867 , 0.944]	0.901 [0.852 , 0.952]	0.891 [0.843 , 0.943]	0.907 [0.860 , 0.957]
Population Standard Deviation		0.288 [0.161 , 0.415]	0.282 [0.155 , 0.409]	0.301 [0.182 , 0.419]
3. *Recognition by Patients*	1.105 [1.055 , 1.157]	1.118 [1.064 , 1.176]	1.116 [1.061 , 1.173]	1.098 [1.047 , 1.151]
4. *Prestige among Colleagues*	1.082 [1.024 , 1.143]	1.096 [1.033 , 1.163]	1.110 [1.046 , 1.179]	1.062 [1.005 , 1.121]
5. *Opportunity for Professional Development*	1.326 [1.254 , 1.403]	1.347 [1.267 , 1.432]	1.347 [1.265 , 1.433]	1.303 [1.229 , 1.381]
6. *Annual Remuneration with 10–15 Years Experience* [c]	0.821 [0.782 , 0.863]	0.812 [0.770 , 0.856]	1.062 [0.701 , 1.610]	
Interaction: *Female Gender*			0.884 [0.817 , 0.957]	
Interaction: *Concordance with Favorite Specialty* [d]			0.885 [0.815 , 0.962]	
Interaction: *Age (Years)*			0.995 [0.978 , 1.012]	
7. *Proportion of Compensation from Private Practice* [b]	1.195 [1.139 , 1.255]	1.210 [1.148 , 1.276]	1.218 [1.154 , 1.285]	1.071 [1.028 , 1.116]
Number of respondents [e]	836	836	818	887
Number of observations [f]	4,839	4,839	4,738	5,184

a. The coefficients represent the effect of a unit change in the independent variable on the odds of preferring a specialty. Numbers in brackets below each coefficient are 95% confidence intervals.
b. Attribute values normalized to range from 0 to 10, so that each unit corresponds to 10 percent.
c. Attribute values normalized so that each unit corresponds to €10,000.
d. Binary variable equal to 1 when the student's preferred specialty is also his favorite specialty.
e. Number of students with data on all explanatory variables in the model.
f. Number of specialty choices with data on all explanatory variables in the model.

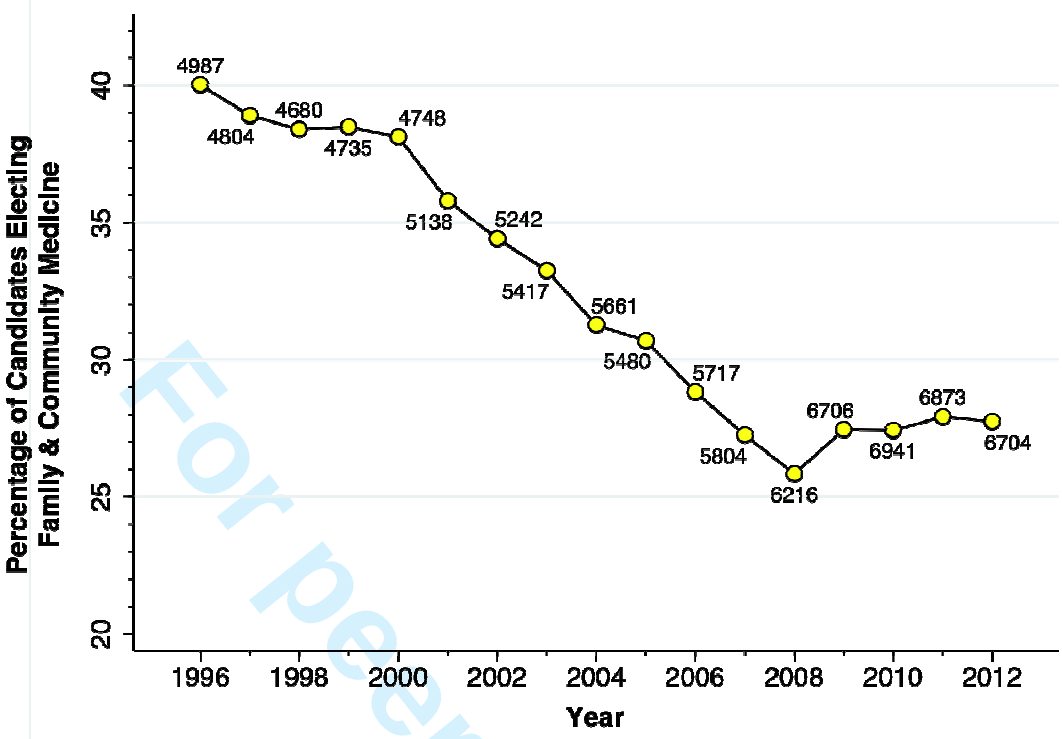

Figure 1. Percentage of Candidates Participating in the Annual Internship-Residency ("MIR") Selection Process Who Elected a Training Position in Family and Community Medicine, 1996–2012. Adjacent to each point is the total number of candidates participating in the MIR selection process in the corresponding year. *Source:* Compiled from annual data provided by the Ministerio de Sanidad y Política Social, Subdirección General de Ordenación Profesional, Spain.

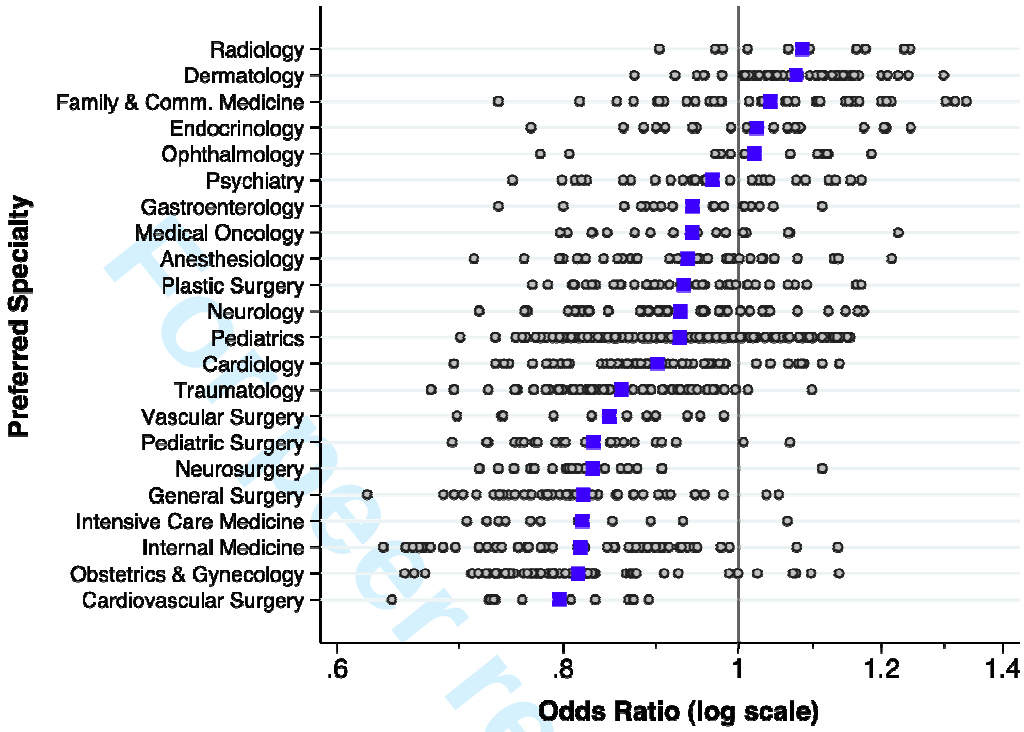

Figure 2. Effect of a 1-point increment in *Lifestyle & Work Hours* rating on odds ratio of preferring a specialty. Each point corresponds to an individual student. The points are classified by the student's preferred specialty. The blue squares show the mean effect for each preferred specialty. Not shown are preferred specialties with fewer than 10 respondents.

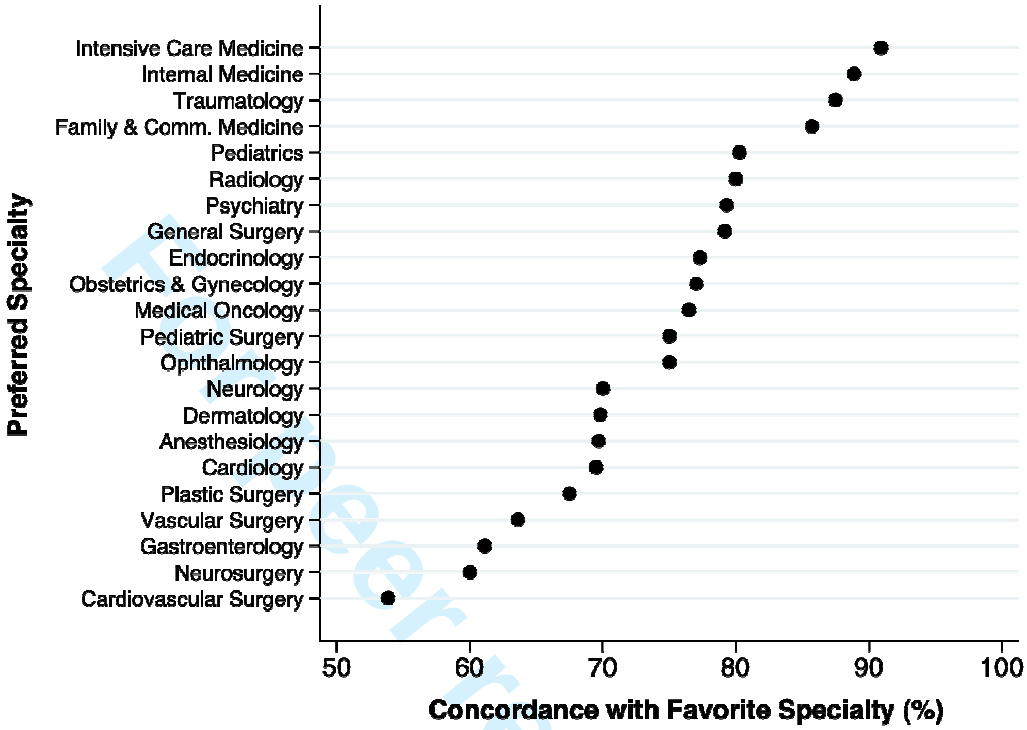

Figure 3. Concordance of preferred with favorite specialty. For each preferred specialty, the black points show the proportion of students who also designated that specialty as their favorite.

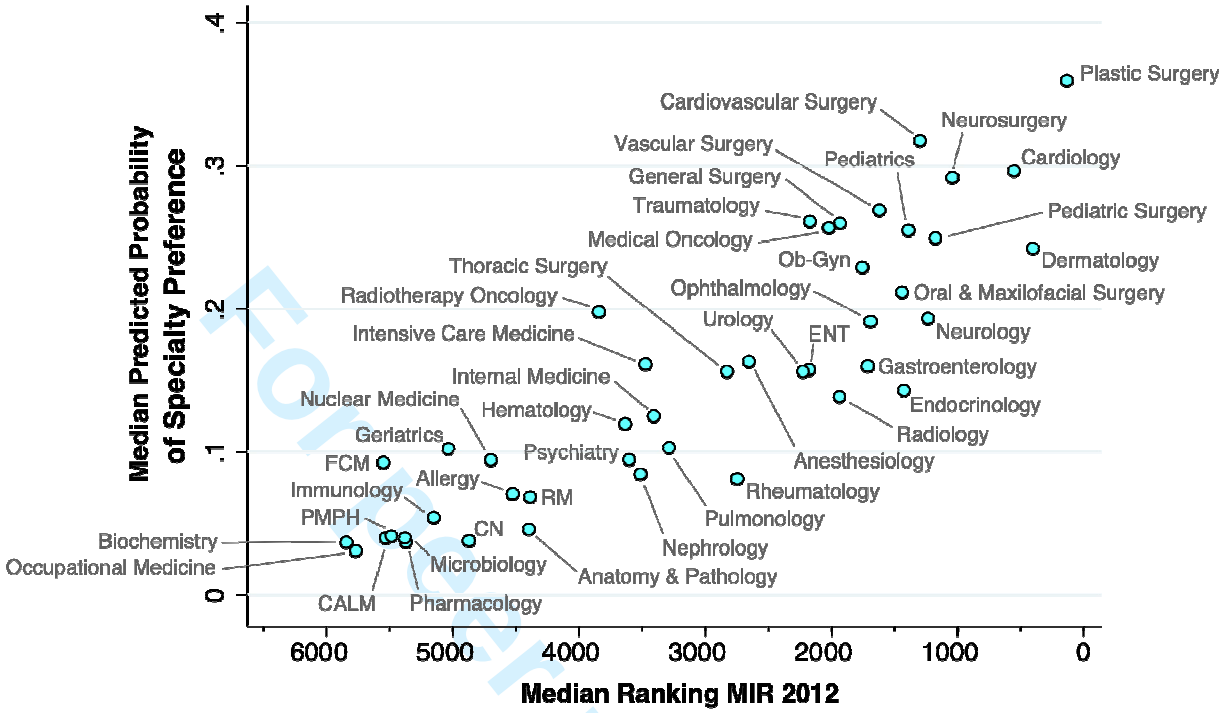

Figure 4. Median predicted probability of specialty preference in relation to the median specialty ranking in the 2012 MIR selection process. CALM = Clinical Analysis & Laboratory Medicine. CN = Clinical Neurophysiology. ENT = Otorhinolaryngology. FCM = Family and Community Medicine. Ob-Gyn = Obstetrics & Gynecology. PMPH = Preventive Medicine & Public Health. RM = Rehabilitation Medicine.

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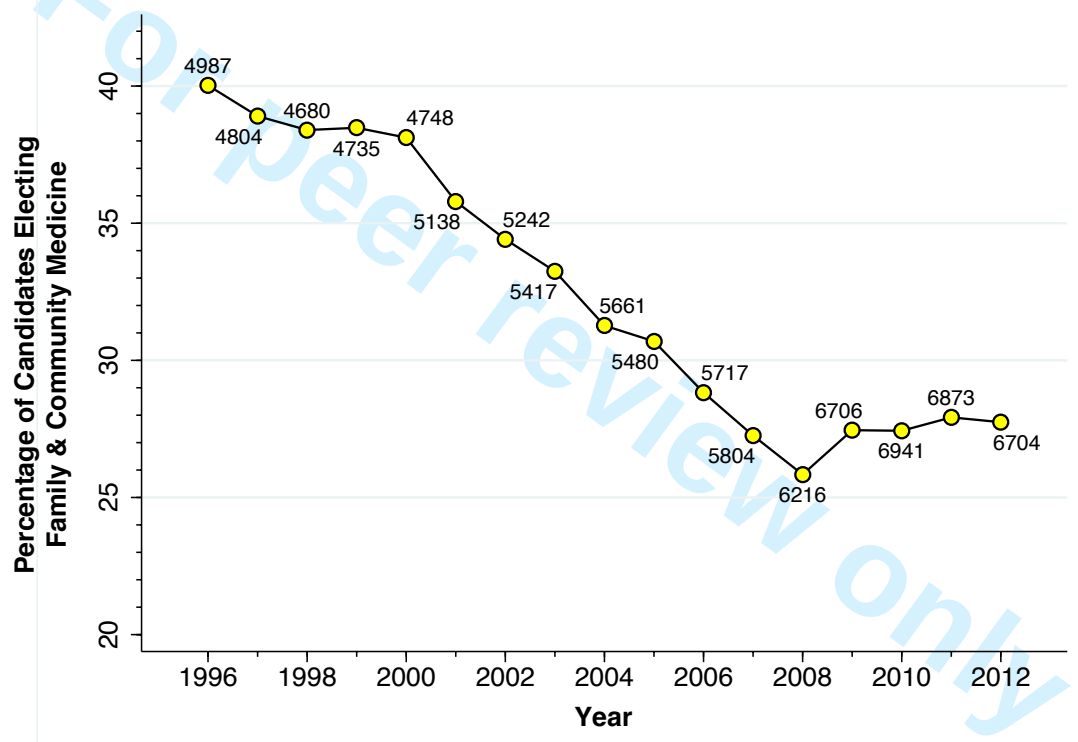

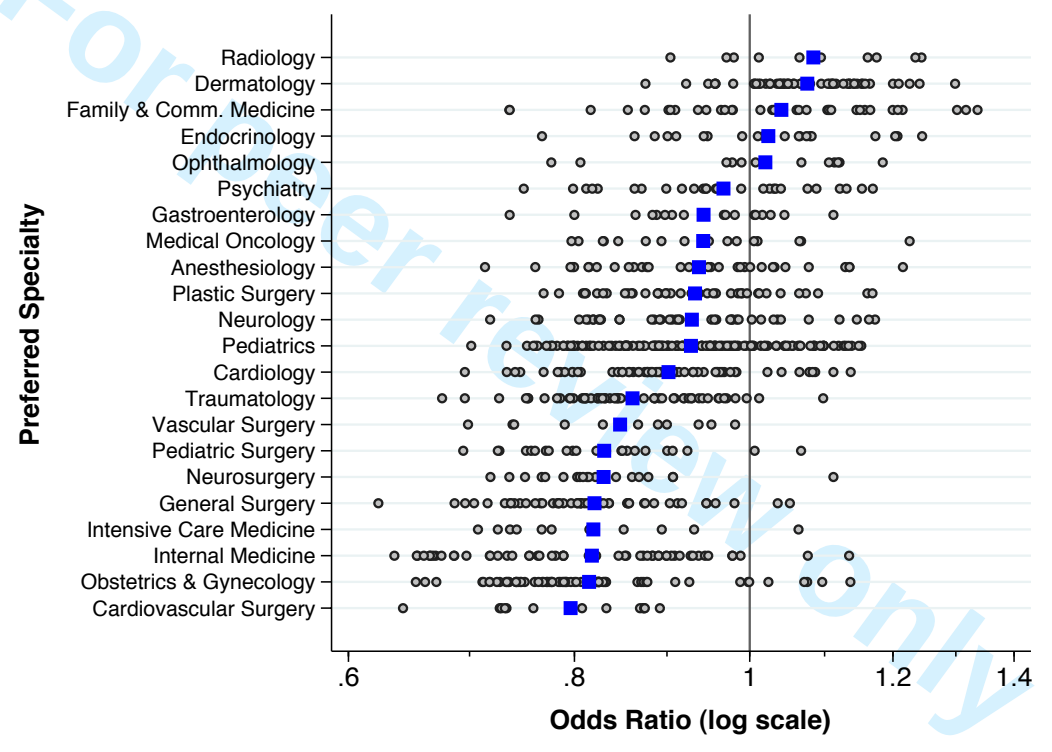

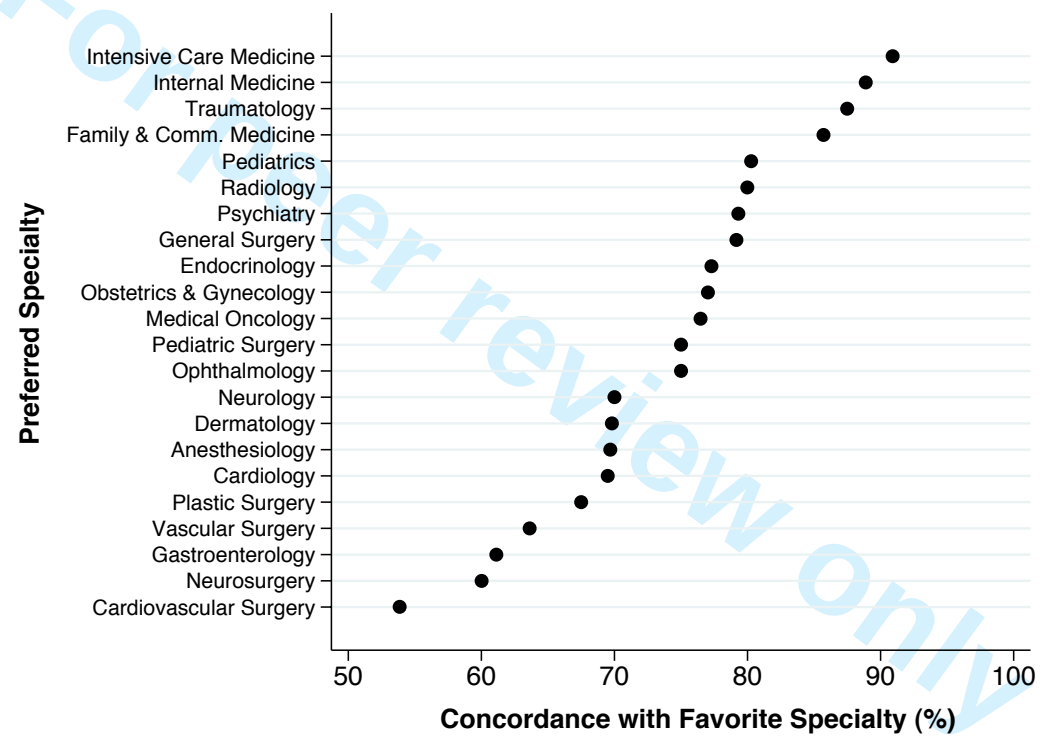

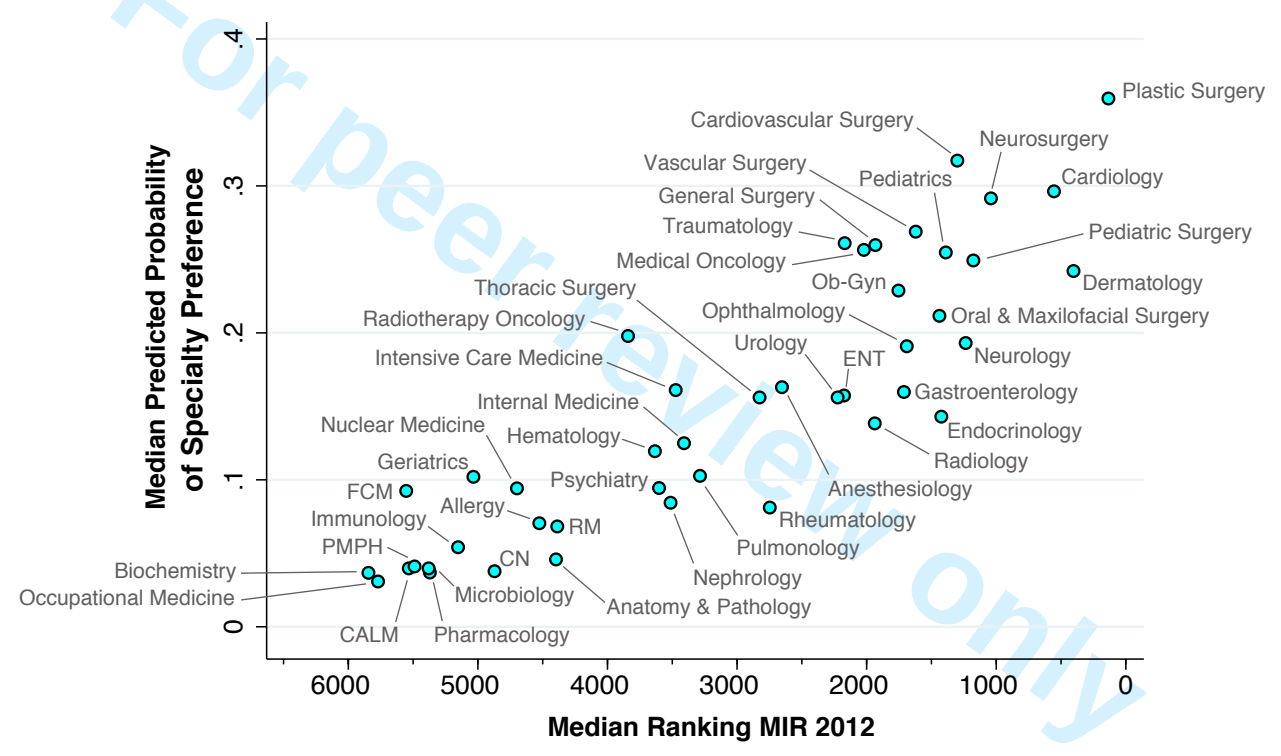

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Specialty choice in times of economic crisis: cross-sectional survey of Spanish medical students

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Specialty choice in times of economic crisis: cross-sectional survey of Spanish medical students

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Article Summary

Article focus.

- Ours is the first comprehensive study of the determinants of physician specialty choice in Spain, a country whose healthcare system is dominated by the public sector.
- Since 2008, when Spain entered into a severe, ongoing economic crisis, the percentage of Spanish medical school graduates electing Family and Community Medicine (FCM) has experienced a reversal after more than a decade of decline.
- In an April 2011 nationwide cross-sectional survey of graduating students from all Spanish medical schools, we focus on the likelihood of obtaining employment as a determinant of physician specialty choice.

Key messages.

- We find that job availability has assumed a key role in determining specialty choice.
- We confirm the importance of such factors as prestige, opportunity for professional development, and private sector remuneration.
- In contrast to prior studies, we find wide variation in the importance that Spanish medical students attach to a controllable life style and reduced work hours.

Strengths and limitations of this study.

- Our findings suggest policy levers that may take advantage of the high level of perceived job security of Family and Community Medicine and thus increase the flow of medical school graduates into the field.

In the present study, we use online survey methods to achieve wide coverage of all 27 of Spain's medical schools at the expense of a reduced response rate. Moreover, we do not report longitudinal follow-up data on our respondents' specialty preferences over time.

Abstract

Objective. To investigate the determinants of specialty choice among graduating medical students in Spain, a country that entered into a severe, ongoing economic crisis in 2008.

Setting. Since 2008, the percentage of Spanish medical school graduates electing Family and Community Medicine (FCM) has experienced a reversal after more than a decade of decline.

Design. Nationwide cross-sectional survey conducted online in April 2011.

Participants. We invited all students in their final year before graduation from each of Spain's 27 public and private medical schools to participate.

Main outcome measures. Respondents' preferred specialty in relation to their perceptions of: (1) the probability of obtaining employment; (2) lifestyle and work hours; (3) recognition by patients; (4) prestige among colleagues; (5) opportunity for professional development; (6) annual remuneration; and (7) the proportion of the physician's compensation from private practice.

Results. 978 medical students (25% of the nationwide population of students in their final year) participated. Perceived job availability had the largest impact on specialty

preference. Each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% CI, 27.2% – 40.5%). Job availability was 4 times as important as compensation from private practice in determining specialty choice (95% CI, 1.7–6.8). We observed considerable heterogeneity in the influence of life style and work hours, with students who preferred such specialties as Cardiovascular Surgery and Obstetrics & Gynecology valuing longer, rather than shorter workdays.

Conclusions. In the midst of an ongoing economic crisis, job availability has assumed critical importance as a determinant of specialty preference among Spanish medical students. In view of the shortage of practitioners of Family and Community Medicine, public policies that take advantage of the enhanced perceived job availability of FCM may help steer medical school graduates into this specialty.

Introduction

During the past two decades, researchers have carried out numerous studies of the determinants of specialty choice.[1-37] While most have been conducted in the United States,[1-13 16 18 19 22 24 25] others have addressed the determinants of specialization in Canada,[14 17 21 23 32] Australia,[15 35] the United Kingdom,[20 26 30 34] Ireland,[29] France,[27 36] Finland,[31] Germany,[33] Spain,[37] and Japan.[28] In view of growing concerns about a shortage of generalists, many studies have focused on the decision to seek a career in primary care,[2 4-6 18 25] family medicine,[14 32] general practice,[15 20 33 35] internal medicine,[22 24] pediatrics,[30] and general surgery.[9 13 16 19 23 29 34]

An extensive list of factors influencing specialty choice has been considered, including: financial remuneration,[1-6 8-15 17 19 24 35] life style and work hours,[1 2 4-16 19 21-24 29 33 35-37] prestige among colleagues or the general public,[1-5 9 10 13-15 19 25 37] mentors and other role models,[1 5 7 15 16 18 19 21 23 31 34 36] the length of the residency training program,[1 3 5 12 13 15 16 32] the clinical clerkship experience in medical school,[1 5 13 15 16 19 21 22 25 30] direct patient interaction and continuity of care,[2-4 9 10 13 24 27 32 33 35] debt upon graduation,[5 6 8 13 15 16 22 25] research and teaching opportunities,[2 5 10 14 15 35] potential for career advancement,[13 15 29 31] influence of parents, relatives and peers,[4 5 15 32] malpractice litigation risk,[8 9 15] opportunity to perform procedures or work with new technology,[2 5 15 21 23] intellectual challenge,[7 9] and hospital versus ambulatory orientation.[2 23] Gender differences in the importance of these factors have also been studied.[8 19-21 27-29]

In 2011, we conducted a cross-sectional survey of Spanish medical students in their final year before electing a specialty training program. In view of the severe, ongoing economic crisis that began in late 2008, we studied whether the likelihood of obtaining employment had assumed a key role in determining specialty preference.

Spain's Healthcare System and the Financial Crisis

The Spanish healthcare system is dominated by the public sector. In 2009, total healthcare expenditures constituted 9.5% of GDP, of which only 2.5% was privately financed. The vast majority of physicians are employees of the public sector, where salaries are fixed by separate negotiations between unions of healthcare workers and the governments of each of Spain's 17 autonomous communities. Physicians in many specialties have opportunities to earn additional income in the private sector, either by

treating paying patients in their own private practices or by performing consults on inpatients while on call at private hospitals. However, there is essentially no such demand for specialists in Family and Community Medicine (FCM), who work almost exclusively as full-time employees of health centers.

Medical specialization in Spain is governed by a system widely known as MIR, which stands for Médico Interno Residente, literally "resident medical intern."[38 39] On an annual basis, the central government's Ministry of Health authorizes post-graduate training programs in 47 different specialties, imposing limits on the number of positions (plazas) in each program. Each medical school graduate (candidato) seeking a training position is ranked on the basis of his academic transcript and his score on the annual nationwide MIR examination. In a sequential process, the top-ranked applicant first chooses from all available training programs, after which each successively ranked candidate is permitted to choose from the remaining available training slots. In the 2011 MIR cycle, for example, the Ministry of Health authorized 6,881 positions in 560 training centers throughout the country.[40] A total of 6,873 applicants accepted training positions through the sequential selection process.

Unemployment among graduates of Spanish medical schools was a relatively rare phenomenon until the financial crisis erupted in late 2008. With real gross domestic product in decline, the nationwide unemployment exceeding 10 percent and heading toward 20 percent, and interest rates on Spanish sovereign debt approaching record highs, federal and regional governments began to engage in increasingly severe budgetary cutbacks. The healthcare sector was not immune from these budgetary cuts. While established physicians with seniority had essentially lifetime government jobs, many

younger graduates were compelled to accept contingent employment contracts. Still others could not find work at all. By February 2010, the number of out-of-work physicians nationwide had for the first time crossed the psychological threshold of 1,000.[41] In the spring of 2011, when the survey described in this report was in the field, there were prominent headlines about personnel cuts in the health budgets of many autonomous communities, notably Catalonia.[42] By April 2012, with increasing austerity measures, the number of unemployed physicians had broken the 2,000 barrier.[43]

There is presumptive evidence that the financial crisis has had a significant effect on the career choices of recent medical school graduates. As Figure 1 indicates, the percentage of candidates participating in the annual MIR selection process who elected a training position in Family and Community Medicine underwent an abrupt reversal after 2008. For the past three years (2010–2012), the number of candidates electing FCM has been limited by the number of available training positions, whereas during 2006–2009, some training positions in FCM remained unfilled.

Subjects and Methods

Cross-sectional survey

In April 2011, with the assistance of professors, deans and student associations, we invited all students in their final year in each of the 27 medical schools of Spain to participate in a survey of career preferences. Students were not contacted individually. Instead, posters advertising the survey and directing students to the survey web site were posted on every medical school campus. Participants were eligible to win a lottery prize. Participation in the survey was voluntary, and anonymity was assured. With the

exception of students at the University of Las Palmas de Gran Canaria, who took the electronic survey as a classroom-based pilot, all respondents completed the survey online.

Survey questionnaire

The electronic survey questionnaire contained three blocks: (1) personal data (age, sex, nationality, residential postal code, university, anticipated date of graduation, and how many parents or grandparents were physicians); (2) questions eliciting preferences among the 47 specialties in Spain's MIR system of postgraduate training; and (3) questions eliciting perceptions and expectations concerning these specialties.

In the second block, in particular, each student was first asked to designate his *preferred specialty*, that is, which specialty he would choose in the annual MIR selection process if he faced no restrictions as a result of his academic performance or his score on the nationwide exam. Each student was then asked to designate his *favorite specialty*, that is, which specialty he enjoyed the most, without regard to remuneration or working conditions ("Sin tener en cuenta los aspectos económicos, condiciones laborales, etc., ¿cuál es la especialidad que más te gusta?").

In the third block, each student was presented with seven questions concerning each specialty within a limited menu of six specialties. The menu included the preferred specialty he had just chosen in the second block, the specialty of Family and Community Medicine, and four other specialties chosen at random from four balanced subsets. Each subset contained medical, surgical and diagnostic specialties, with one specialty in each quartile of the global ranking of specialties observed in the MIR 2010 selection cycle.[38]

The seven questions, whose translated text appears in Table 1, addressed the following attributes of each specialty: (1) the probability of obtaining employment; (2) lifestyle and work hours; (3) recognition by patients; (4) prestige among colleagues; (5) opportunity for professional development; (6) annual remuneration for a physician with 10–15 years experience; and (7) the proportion of the physician's compensation from private practice. Four of the attributes (2, 3, 4 and 5) were measured on a 10-point scale, while two (1 and 7) were gauged on a percentage scale from 0 to 100. The remaining attribute (6) was measured in thousands of euros. We chose these seven attributes based upon our review of the literature and our discussions with experts knowledgeable about Spanish healthcare institutions. Inclusion of the first attribute, in particular, was motivated by our hypothesis that the ongoing economic crisis and widely publicized budgetary cuts in the health sector had influenced students' perceptions about the likelihood of employment.

Statistical methods

We employed the mixed multinomial logit model[44] to assess the influence of each of the seven attributes on students' choice of preferred specialty. The mixed multinomial logit model differs from the standard multinomial logit model in that the coefficients of each predictor variable may vary randomly in the population. In the context of discrete choice modeling, the mixed multinomial logit model captures the potential heterogeneity of individual preferences. For example, in the case of attribute 2, the mixed model admits the possibility that some students prefer a specialty with reduced work hours and a

comfortable life style, while others prefer a specialty with long work hours and little leisure time.

In our application of the mixed multinomial logit model, the observations corresponded to the six specialties within the menus evaluated by each of the student respondents. For each student, the dependent variable was a binary indicator equal to 1 for the preferred specialty and 0 for the remaining five specialties in the student's menu. The independent variables were each student's valuations of the seven attributes. In addition, we included interaction terms between each of the seven attributes and each personal characteristic in order to test whether the coefficients of the attributes differed by sex, age, university, expected graduation date, or the presence of physicians in the family. We also tested interactions between each attribute and a binary variable indicating concordance between the student's preferred and favorite specialty.

Adhering to the mixed logit specification, we further assumed that the coefficients of each attribute were normally distributed in the population with unknown mean and standard deviation. To assess whether there was significant heterogeneity in the coefficients of each attribute, apart from those differences attributable to the foregoing observed personal characteristics, we tested the null hypothesis that the estimated standard deviation of each coefficient's population distribution was equal to zero. We employed the chi-squared test based on the log likelihood ratio to assess the overall model goodness of fit.

To estimate our mixed multinomial logit model, we relied on the *mixlogit* routine in Stata 11 statistical software.[45] Each raw coefficient outputted by this routine corresponds to the effect of a unit change in each attribute on the logarithm of the odds of

preferring a specialty. Each raw coefficient can also be interpreted as the contribution of a unit change in each attribute to the "utility" of the specialty. In the tabulated results below, we report the exponentiated values of the raw coefficients, that is, the effect of a unit change on the odds of specialty preference. However, we used the raw coefficients to assess the quantitative tradeoffs between attributes. For example, to estimate the percentage increase in the proportion of the physician's compensation from private practice (attribute 7) that would yield the same utility as a 1-percent increase in the probability of obtaining employment (attribute 1), we computed the ratio of the raw coefficient of attribute 1 to the raw coefficient of attribute 7.

Finally, to assess the external validity of our mixed multinomial logit model, we compared its predictions of specialty choice with the global ranking of specialties observed among the same nationwide cohort of medical graduates in the 2012 MIR selection process. We chose the 2012 MIR cycle for comparison because the students responding to our April 2011 survey subsequently graduated from medical school in June 2011, then studied for and took the MIR exam in January 2012, and then made their specialty selections during March of that year. Specifically, for each specialty within each student's menu, we computed the predicted probability that the student would prefer that specialty. For each specialty, we then compared its median predicted probability, as derived from our model, with its median ranking among all candidates who elected a specialty in the 2012 MIR cycle.

Results

Survey Response

Out of a total population of 3,874 registered sixth-year medical students nationwide, we received 978 responses (or 25%). These responses included students from each of Spain's 27 medical schools. While the response rate varied among medical schools, there were no significant differences in the gender or age composition of the respondents and the entire nationwide population (survey respondents: 71% female, mean age 24.1 years; nationwide population of sixth-year students: 71% female, mean age 24.7 years).

Descriptive Statistics

Among the 978 medical students responding to the survey, 892 (91.2%) designated a preferred specialty, of whom 836 (93.7%) also designated a favorite specialty. For each of the seven questions, Table 1 shows the corresponding sample means and standard deviations of students' responses for FCM and for all remaining specialties combined, For all seven attributes, the differences in the mean ratings between FCM and other specialties combined were statistically significant ($P < 0.001$).

Predictors of Specialty Preference

Table 2 gives the principal results of our regression analyses. Model 1 represents the standard multinomial logit regression, in which all attribute coefficients are fixed, while Models 2 through 4 represent mixed multinomial logit regressions. In Model 2, in particular, the coefficient of attribute 2 (lifestyle and work hours) is permitted to vary within the population. In Model 3, interaction terms with attribute 6 (annual remuneration with 10–15 years' experience) are included as explanatory variables. In Model 4, attribute

6 and its interactions are removed altogether. We omit the results of other models where we found insignificant interactions between each attribute and sex, age, university, expected graduation date, the presence of physicians in the family, as well as a binary variable indicating concordance between the student's preferred and favorite specialty.

In all model specifications in Table 2, attribute 1 (the probability of obtaining employment) significantly influenced specialty preference. In Model 4, for example, each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% confidence interval (CI), 27.2% – 40.5%). The magnitude of the effect was comparable to that of attribute 5 (professional development, including the possibility of promotion). Attributes 3 (recognition by patients) and 4 (prestige among colleagues) had smaller but significantly positive influences on specialty choice. For both attributes, a 1-point increment on a 10-point scale increased the odds of preferring a specialty by approximately 10–11 percent. The findings of Model 4 were not significantly altered when we included an interaction term for students at the University of Las Palmas de Gran Canaria, who took the electronic survey as a classroom-based pilot. (Results not shown.)

Heterogeneity of Preferences for Life Style and Work Hours

Although attribute 2 (life style and work hours) appeared to have a significant negative influence on specialty choice, our mixed multinomial logit Models 2, 3 and 4 revealed considerable population heterogeneity in this effect. In Model 4, for example, the population average effect was 0.907, with a 1-standard deviation range from 0.606 to 1.208 (that is, 0.907 ± 0.301). Equivalently, a 1-point increment on a 10-point scale

reduced the odds of preferring a specialty *on average* by an estimated 9.3 percent. However, for 68 percent of the students (which corresponds to the 1-standard deviation range for a normal distribution), the effect of a 1-point increment ranged from a 39.4 percent decrease to a 20.8 percent increase in the odds of preferring a specialty. Attribute 2 was the only explanatory variable to show significant population heterogeneity in our mixed multinomial logit regressions.

Figure 2 offers a visual representation of the population heterogeneity in the influence of lifestyle and work hours. Each open point in the figure represents one student. The points are arranged in rows corresponding to the student's preferred specialty. Among the 887 students included in Model 4, a total of 231 (or 26 percent) had a positive predicted effect of lifestyle and work hours on specialty preference.

Figure 2 displays considerable heterogeneity between preferred specialties. For example, among the group of 53 students preferring Dermatology, whose predicted effects are arrayed in the second row in Figure 2, the average effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours was a 7.6-percent increase in the odds of preferring that specialty (corresponding to the solid blue square in the second row). Within this group, the predicted effect ranged from a 12.5-percent decrease to a 29.9-percent increase. For the 35 students preferring Family and Community Medicine, arrayed on the third row, the average effect of a 1-point increment along the scale of lifestyle and work hours was a 4.1-percent increase in the odds of specialty preference (corresponding to the solid blue square in the third row), with a predicted effect ranging from a 26.4-percent decrease to a 33.6-percent increase. By contrast, among the group of 73 students preferring Obstetrics & Gynecology, whose

predicted effects are arrayed in the next-to-last row of the figure, the average effect of a 1-point increment was an 18.5 percent decrease in the odds of preferring that specialty (the next-to-last solid blue square). Within this group, the predicted effect ranged from a 34.6-percent decrease to a 13.7-percent increase.

Concordance between Preferred and Favorite Specialties

Among the 892 students who reported both a preferred and a favorite specialty, we observed a concordance between the two responses in 676 students (or 75.8%). Figure 3 shows the rate of concordance, classified by preferred specialty. The rate of concordance ranged from a low of 53.8 percent among students who preferred Cardiovascular Surgery to 90.9 percent among those who preferred Intensive Care Medicine. The rate of concordance for Family and Community Medicine was 85.7 percent.

Opportunities for Private Sector Remuneration

In Models 1 and 2 in Table 2, attribute 6 (annual remuneration with 10–15 years experience) had a significant negative influence on specialty preference, while attribute 7 (proportion of compensation from private practice) had a significant positive effect. To address the apparent inconsistency between the estimated effects of the two different attributes, we included interaction terms with attribute 6 in our specification of Model 3. We found that the negative relation between annual remuneration and specialty preference remained statistically significant for female students and for those who reported a concordance of preferred and favorite specialty. There was no relationship between the effect of annual remuneration and a student's age.

Finally, in Model 4, when we dropped attribute 6 altogether, the effect of attribute 7 remained significant and positive, but its magnitude was decreased. With annual remuneration included as an explanatory variable, each 10-percent increment in the proportion of compensation from private practice increased the odds of preferring a specialty by approximately 20–22 percent. With annual remuneration excluded, the effect of 10-percent increment in the proportion of compensation from private practice compensation increased the odds of specialty preference by only 7 percent.

Tradeoff between Job Availability and Opportunities for Private Sector Remuneration

We focused specifically on the quantitative tradeoff between job availability (attribute 1) and opportunities for private sector remuneration (attribute 7). Relying on the results of Model 4, we found that the raw coefficients of attributes 1 and 7 were, respectively, 0.290 (95% CI, 0.241− 0.340) and 0.069 (95% CI, 0.028−0.110). The percentage increase in the proportion of the physician′s compensation from private practice (attribute 7) that would yield the same utility as a 1-percent increase in the probability of obtaining employment (attribute 1) was therefore 0.290⁄0.069 = 4.2. Based on a linear approximation of the variance of the ratio of two random variables, we computed the 95% confidence interval around this estimate as 1.7−6.8.

External Validity: Comparison with MIR 2012 Global Rankings

For all four models, the chi-squared statistic based on the log likelihood ratio showed a significant goodness of fit ($P < 0.002$). As a further check of internal validity, we found a

close match between the observed and predicted probabilities of specialty choice when broken down by decile of predicted probability.[46]

Figure 4 displays a check of external validity. For each specialty, the figure plots median predicted probability of specialty preference against the median specialty ranking in the 2012 MIR cycle. The latter variable is plotted on a reverse scale since the most preferred specialties in the MIR selection process will have the lowest ranking numbers. Also plotted is the ordinary least squares regression line relating the two variables. The Spearman rank correlation between the two variables was –0.88 and highly significant ($P < 0.0001$).

The strong correlation between the model predictions and the MIR rankings can be seen through a comparison of Cardiology at the upper right, Anesthesiology near the center, and Family and Community Medicine (FCM) near the bottom left. Thus, among the 6,704 candidates nationwide who elected a specialty during the 2012 MIR selection process, the median ranking of those candidates choosing Cardiology was 555. (Only two specialties had a higher median ranking: Plastic Surgery at 136, and Dermatology at 404.) From a menu of six specialties offered to students participating in our survey, the median predicted probability of preferring Cardiology was 29.6 percent. For Anesthesiology, by contrast, the median ranking in the 2012 MIR cycle was 2,652, while the median predicted probability among survey respondents was 16.3 percent. For Family and Community Medicine, the median ranking in the 2012 MIR cycle was 5,552, while the median predicted probability among survey respondents was 9.2 percent.

Discussion

In a cross-sectional survey of medical students in their final year before graduation, conducted in the midst of Spain's economic crisis, we found that job availability had significant impact on the specialty preference. Based upon our Model 4 specification, we found that each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% CI, 27.2% – 40.5%). Moreover, we observed considerable variability in the effect of lifestyle and work hours on students' specialty preferences. Among students who would elect Dermatology if there were no restrictions on specialty choice, the average effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours was a 7.6-percent increase in the odds of preferring that specialty. By contrast, among students preferring Obstetrics & Gynecology, the average effect of a 1-point increment was an 18.5 percent decrease in the odds of preferring that specialty.

We also asked students to designate their favorite specialty, that is, the specialty that they enjoyed the most, independent of future remuneration or working conditions. The concordance between students' preferred and favorite specialties varied considerably. Approximately 54 percent of students who preferred Cardiovascular Surgery also designated it as their favorite specialty. By contrast, approximately 86 percent of students who preferred Family and Community Medicine also designated it as their favorite specialty, while 91 percent of students who preferred Intensive Care Medicine also designated it as their favorite specialty.

Our survey included two attributes that reflected different aspects of physician compensation: the average remuneration of a physician with 10–15 years experience, and

the proportion of compensation from private practice. We found that the former had an unexpectedly negative relation to specialty preference, particularly among female students and those favorite specialty matched their preferred specialty, while the latter had a significant positive relation to specialty preference (Model 3). Eliminating the former from our regression analysis (Model 4), we estimated the tradeoff between job security and opportunities for private practice. An increase of approximately 4 percent in the proportion of the physician's compensation from private practice would yield the same utility as a 1-percent increase in the probability of obtaining employment.

Finally, as an external validity check, we found a high correlation between the specialty ranking predicted by our mixed multinomial logit model with the nationwide specialty ranking in the 2012 MIR selection process. In particular, the median probability that a student would select Family and Community Medicine out of a menu of six specialty choices was approximately 9 percent, while the median MIR ranking of this specialty was 5,552 out of 6,704 candidates.

Study Limitations

Our study has a number of important limitations. To begin with, our survey sample of 978 respondents constituted only 25% of the entire nationwide population of 3,874 registered students in their final year of medical school. While our sample covered all 27 of Spain's medical schools, and while we found no significant difference in gender or age composition between our sample and the entire nationwide population, the apparently low response rate raises the possibility that our conclusions cannot be generalized or are subject to non-response bias.

Open-ended online surveys generally yield much lower response rates than a direct personal invitation via postal mail accompanied by a paper questionnaire.[47] In particular, surveys of specialty choice among students in a single medical school or clinical rotation have yielded high response rates ranging from 65 to 97 percent.[4 5 7 9 13 28-30 34 37] By contrast, an Internet-based survey soliciting participation of students in 70 U.S. medical schools received online responses from students in only 16 schools.[16] An online survey covering students in all five medical schools in the federal state of Baden-Wuerttemberg in Germany yielded only 11% of eligible students.[33] A recent online survey of students taking the 2011 National Grading Examination in France yielded a 24% response rate.[36]

Despite the low response rate, our Internet-based survey achieved wide coverage at low cost. It is at least arguable that the conclusions from our sample of 978 students from all 27 of Spain's medical schools are more generalizable than a hypothetical study of a 100-percent sample of 978 students from a single medical school. Nor do we have any evidence of significant non-response bias. Students at the University of Las Palmas de Gran Canaria, who took the survey as a classroom pilot and had a higher response rate, nonetheless placed the same valuation on job availability as those who look the survey online.

An additional limitation of our study is the lack of prior survey results for comparison. We surveyed students only once in April 2011. We have no data from a comparable cross-sectional survey carried out before the onset of Spain's economic crisis in late 2008. Our results are at least consistent with the finding from a 2009 survey in Ireland – carried out in the midst of the country's financial crisis – that medical students

and junior doctors attached high importance to "future employment" in specialty choice.[29] A 2010 survey of all first- through sixth-year medical students from a single Spanish medical school found that "quality of life" and "professional prestige" were important factors in specialty choice, but aspects of job security were not considered.[37] Further confirmation of the lasting importance of job security in specialty choice will require repeat surveys once employment prospects for physicians have improved.

Nor do we report longitudinal follow-up data on the evolution of our respondents' specialty preferences over time. There is evidence from longitudinal studies that students' specialty preferences evolve during medical school.[48 49] In a study of internal medicine residents in the United States, 62 percent changed the subspecialty career choice at least once during residency.[50] In a longitudinal follow-up of U.K. medical graduates 10 years after graduation, approximately one-quarter were working in a specialty different from that chosen 3 years after graduation.[26] It is notable, however, that 91.2% of students that we surveyed reported a preferred specialty, whereas in the United Kingdom, 28% of medical school graduates in the 1990s knew their preferred specialty one year after graduation.[26] The high correlation between specialty choice predicted by our model and specialty choices observed in the MIR 2012 cycle (Figure 3) does not suggest a marked shift in preferences during the one-year period after medical school graduation, during which prospective candidates study for the national exam and then participate in the sequential selection process.

The explanatory variables in our model (Table 1) were derived from students' perceptions and expectations, rather than objective data. It is entirely possible, for example, that students exaggerated the importance of job security (attribute 1). By April

2012, with Spain's overall unemployment rate hovering around 25%, the psychologically menacing figure of 2,000 unemployed doctors[51] still represented only 1 percent of the active physician workforce. While a few studies have correlated specialty preferences with objective data on remuneration, work hours, malpractice risk, and debt upon graduation,[8 12] we stress that students' subjective perceptions and expectations are the principal determinants of specialty choice.

While a number of studies have focused on the "controllable lifestyle" as an important determinant of specialty choice,[1 2 4-16 19 21-24 52] our results shed new light on the heterogeneity of preferences for lifestyle and work hours. We find, in fact, that only 26 percent of respondents placed a positive value on reduced work hours, while 74 percent placed a positive value on working more (as shown by the distribution of points in Figure 2). One possible explanation is that, in a healthcare system where public-sector salaries are fixed by collective bargaining, taking on additional on-call assignments after regular working hours is viewed primarily as a means of increasing remuneration. In the EuroStat Labor Force Surveys, Spanish physicians reported working an average of 39 hours per week,[53] even though the collectively agreed-upon formal work week was 35 hours.

Our failure to find a significant positive effect of annual remuneration (attribute 6) may reflect students' inadequate knowledge of physicians' salaries, a phenomenon that has also been observed in the U.S.[54] It is possible that students' estimates of remuneration were overly influenced by short-term concerns about job security, even though the underlying question was framed over a 10–15 year horizon. Nationally representative data on the earnings of Spanish physicians have not been published. Students' estimates of the annual remuneration of a non-FCM specialist were on average 44% greater than

that of a practitioner of FCM (Table 1), a value that falls within the range of specialist-GP remuneration ratios of other OECD countries.[55]

In Canada, physicians' fee-for-service payments correlate strongly with income,[17] whereas in the United Kingdom, opportunities for non-NHS consultant work constitute an important determinant of variations in income.[56] Our finding that attribute 7 was a significant predictor of specialty choice indicates that, in Spain's healthcare system where publicly financed salaries are the dominant form of physician compensation, opportunities for additional private-sector employment are a more sensitive proxy for physician income. For this reason, we based our calculations of the tradeoff between job security and remuneration on the results of Model 4, which excludes attribute 6 entirely.

A few studies have employed a discrete choice experiment – rather than a cross-sectional survey – to assess the determinants of physicians' choice of specialty,[35] working conditions,[56 57] and urban versus rural practice.[58] A discrete choice experiment has the advantage that each potential determinant of physician choice can be independently controlled and varied randomly. In principle, such a study design might have helped us distinguish more precisely between total remuneration (attribute 6) and opportunities for private sector employment (attribute 7). It might also have allowed us to assess more precisely the extent to which the "workaholics" in our study, who preferred specialties with more working hours (attribute 2), would trade off higher income for reduced leisure time. One drawback of the discrete choice experimental design is that respondents choose between hypothetical choices constructed by the experimenter, whereas in our cross-sectional study, we directly observe the perceived attributes of the actual specialty options available to graduating medical students. While the results of discrete choice

experiments can be used in simulations, our cross-sectional design thus facilitates external validation of our results (Figure 4).

We asked students to report both their preferred and favorite specialties, a distinction we have not encountered in any other study. While Spanish medical students generally report a high level of concordance between the two (76%), we observed considerable variation by preferred specialty (Figure 2). It is noteworthy that five of the highest ranked specialties in the 2011 MIR cycle (Cardiovascular Surgery, Neurosurgery, Plastic Surgery, Cardiology and Dermatology; see Figure 4) had low levels of concordance. By contrast, the observed high levels of concordance for Internal Medicine and Family and Community Medicine suggest that students who prefer these specialties do so despite the low salaries, minimal opportunities for private-sector remuneration, or unfavorable working conditions. This conclusion is further supported by the observed negative effect of the interaction between concordance and remuneration in Model 3 (Table 2).

Policy Implications

Increased remuneration, more favorable working conditions and enhanced prestige have routinely been proposed as incentives to lure medical students into primary care and family practice. In Spain, however, physician remuneration within the public sector is determined by decentralized collective bargaining between unions and local governments. Opportunities for practitioners of Family and Community Medicine to earn additional income in the private sector are scarce and even less under the control of the central government. Improvements in working conditions and enhancement of prestige

are longer-term solutions that will require reformulation of the nature of work of the primary care physician and the role of community health centers.[38 39]

Our findings, by contrast, suggest other shorter-term policy levers that may take advantage of the high level of perceived job availability of FCM (Table 1) and thus increase the flow of medical school graduates into the field. To the extent that the healthcare budgets of the country's 17 autonomous communities must continue to endure budgetary cuts, our results argue for sparing community health centers and the practitioners of FCM who work in them. As part of its crisis management, the Spanish central government has recently increased physicians' legal work week from 35 to 37.5 hours, a measure that has sparked more than a few protests.[59 60] Ironically, this measure will cut mostly into the incomes of non-FCM specialists who earned additional income through after-hours private consultations and thus reduce the income disparity with FCM physicians.

As a separate policy instrument, the central government's Ministry of Health could cautiously expand the number of approved post-graduate training positions in FCM, which has recently become a limiting factor in the resurgence of this specialty since 2008 (Figure 1). There is evidence that many residents already in training in FCM have chosen to retake the national MIR exam and reenter the selection process as candidatos despite the requirement that they abandon their current training position.[38] It is conceivable that too large an excess of unfilled training slots in FCM could aggravate this perverse incentive.

Conclusions

In the midst of an ongoing economic crisis, the likelihood of obtaining employment has assumed critical importance as a determinant of specialty preference among Spanish medical students. Public policies that take advantage of the enhanced perceived job availability of FCM may be an effective way to steer medical school graduates into this specialty.

Footnotes

Contributors

All authors (JEH, BGL, VOR, PBP) contributed substantially to the conceptualization and design of the survey. JEH, BGL and PBP performed statistical analyses on the survey data. JEH and BGL wrote the initial drafts, while VOR and PBP made substantive changes to various drafts. All contributors approved the final version for publication.

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Competing Interests

All authors have completed the United Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that they have no competing interests.

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Statement concerning Ethical Approval

No ethical approval was required for this research.

Data Sharing Statement

The detailed results of all statistical analyses, including statistical code, are available from the corresponding author at jeffrey@mit.edu.

Table 1. Seven survey questions on attributes of medical specialties [a]

	Attribute and Survey Text	FCM Mean *S.D.*	All Others Mean *S.D.*
1	*Probability of Obtaining Employment.* "How would you rate the probability of obtaining work in the next three years, whether in the public or private sector, for an individual who became certified in this specialty today? (0 to 100 percent)"	83.98 *19.89*	64.78 *23.92*
2	*Lifestyle & Work Hours.* "Work hours, working conditions, and the ability to reconcile work with family life. (0 to 10, 0 = very bad, 10 = very good)"	7.78 *2.09*	6.78 *2.25*
3	*Recognition by Patients.* "Recognition of professional work on the part of patients. (0 to 10)"	5.92 *2.60*	6.34 *2.73*
4	*Prestige among Colleagues.* "Prestige and recognition among colleagues as well as social recognition. (0 to 10)"	3.92 *2.28*	6.30 *2.52*
5	*Opportunity for Professional Development.* "Possibility of promotion or future professional development within the specialty (new fields, new techniques, scientific advances). (0 to 10)"	5.11 *2.30*	7.20 *2.15*
6	*Annual Remuneration with 10–15 Years Experience.* "Estimate the current average annual gross remuneration (public and private combined) of a specialist with 10–15 years of experience. (Thousands of euros)" [b]	60.00 *0.16*	86.56 *31.96*
7	*Proportion of Compensation from Private Practice.* "What percentage of this remuneration (including public and private) do you believe comes from private practice? (0 to 100 percent)" [b]	0.00 *0.00*	39.32 *23.40*

a. The introductory text was, "In this section, you'll define your profile of some medical specialties, including the one that you've just chosen as your first choice as well as others chosen at random. Think about your *perceptions and expectations* concerning each specialty."

b. The preamble to the two questions on attributes 6 and 7 was: "The following questions are about compensation. To facilitate your responses, recall that the average annual gross income of a full-time specialist in Family & Community Medicine with 10–15 years experience is currently about 60,000 euros."

Table 2. Mixed Multinomial Logit Regression Results [a]

Explanatory Variable	Model 1	Model 2	Model 3	Model 4
1. *Probability of Obtaining Employment* [b]	1.324 [1.263 , 1.388]	1.346 [1.278 , 1.418]	1.339 [1.271 , 1.412]	1.337 [1.272 , 1.405]
2. *Lifestyle & Work Hours*	0.905 [0.867 , 0.944]	0.901 [0.852 , 0.952]	0.891 [0.843 , 0.943]	0.907 [0.860 , 0.957]
Population Standard Deviation		0.288 [0.161 , 0.415]	0.282 [0.155 , 0.409]	0.301 [0.182 , 0.419]
3. *Recognition by Patients*	1.105 [1.055 , 1.157]	1.118 [1.064 , 1.176]	1.116 [1.061 , 1.173]	1.098 [1.047 , 1.151]
4. *Prestige among Colleagues*	1.082 [1.024 , 1.143]	1.096 [1.033 , 1.163]	1.110 [1.046 , 1.179]	1.062 [1.005 , 1.121]
5. *Opportunity for Professional Development*	1.326 [1.254 , 1.403]	1.347 [1.267 , 1.432]	1.347 [1.265 , 1.433]	1.303 [1.229 , 1.381]
6. *Annual Remuneration with 10–15 Years Experience* [c]	0.821 [0.782 , 0.863]	0.812 [0.770 , 0.856]	1.062 [0.701 , 1.610]	
Interaction: *Female Gender*			0.884 [0.817 , 0.957]	
Interaction: *Concordance with Favorite Specialty* [d]			0.885 [0.815 , 0.962]	
Interaction: *Age (Years)*			0.995 [0.978 , 1.012]	
7. *Proportion of Compensation from Private Practice* [b]	1.195 [1.139 , 1.255]	1.210 [1.148 , 1.276]	1.218 [1.154 , 1.285]	1.071 [1.028 , 1.116]
Number of respondents [e]	836	836	818	887
Number of observations [f]	4,839	4,839	4,738	5,184

a. The coefficients represent the effect of a unit change in the independent variable on the odds of preferring a specialty. Numbers in brackets below each coefficient are 95% confidence intervals.
b. Attribute values normalized to range from 0 to 10, so that each unit corresponds to 10 percent.
c. Attribute values normalized so that each unit corresponds to €10,000.
d. Binary variable equal to 1 when the student's preferred specialty is also his favorite specialty.
e. Number of students with data on all explanatory variables in the model.
f. Number of specialty choices with data on all explanatory variables in the model.

Figure Legends

Figure 1. Percentage of Candidates Participating in the Annual Internship-Residency ("MIR") Selection Process Who Elected a Training Position in Family and Community Medicine, 1996–2012. Adjacent to each point is the total number of candidates participating in the MIR selection process in the corresponding year. *Source:* Compiled from annual data provided by the Ministerio de Sanidad y Política Social, Subdirección General de Ordenación Profesional, Spain.

Figure 2. Effect of a 1-point increment in *Lifestyle & Work Hours* rating on odds ratio of preferring a specialty. We used the results of Model 4 to compute the predicted effect for each individual student of a 1-point increment in attribute 2 (Lifestyle & Work Hours). Each open point in the figure represents one student. The points are arranged in rows corresponding to the student's preferred specialty. The horizontal axis gauges the predicted effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours. The solid blue squares represent the population mean effect for students in each preferred specialty. Not shown are preferred specialties with fewer than 10 respondents.

Figure 3. Concordance of preferred with favorite specialty. For each preferred specialty, the black points show the proportion of students who also designated that specialty as their favorite.

Figure 4. Median predicted probability of specialty preference in relation to the median specialty ranking in the 2012 MIR selection process. CALM = Clinical Analysis & Laboratory Medicine. CN = Clinical Neurophysiology. ENT = Otorhinolaryngology. FCM = Family and Community Medicine. Ob-Gyn = Obstetrics & Gynecology. PMPH = Preventive Medicine & Public Health. RM = Rehabilitation Medicine.

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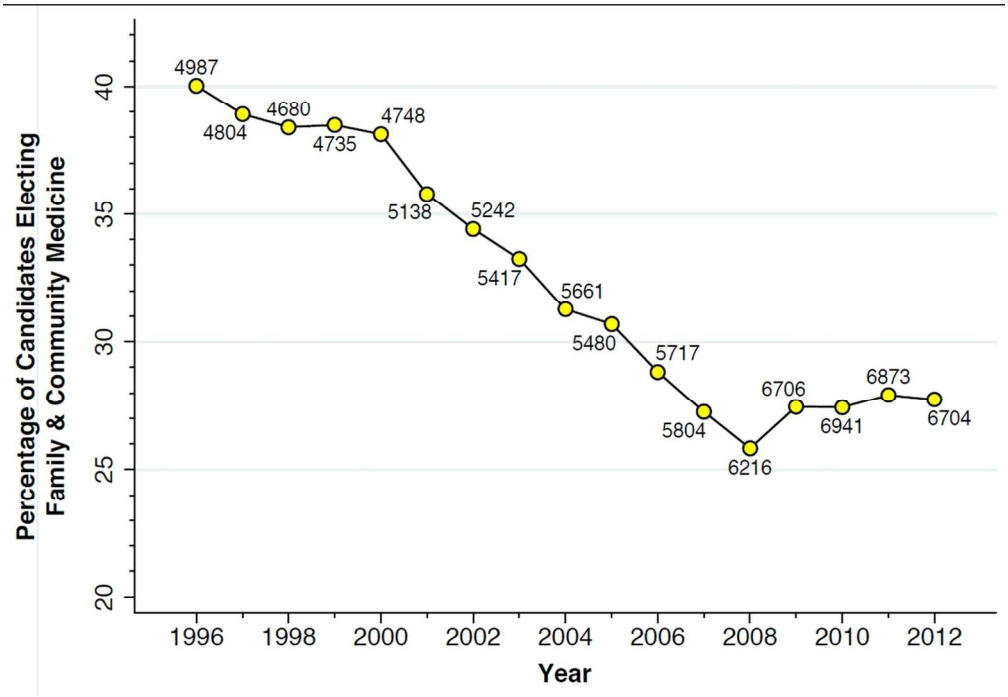

Percentage of Candidates Participating in the Annual Internship-Residency ("MIR") Selection Process Who Elected a Training Position in Family and Community Medicine, 1996–2012. Adjacent to each point is the total number of candidates participating in the MIR selection process in the corresponding year. Source: Compiled from annual data provided by the Ministerio de Sanidad y Política Social, Subdirección General de Ordenación Profesional, Spain
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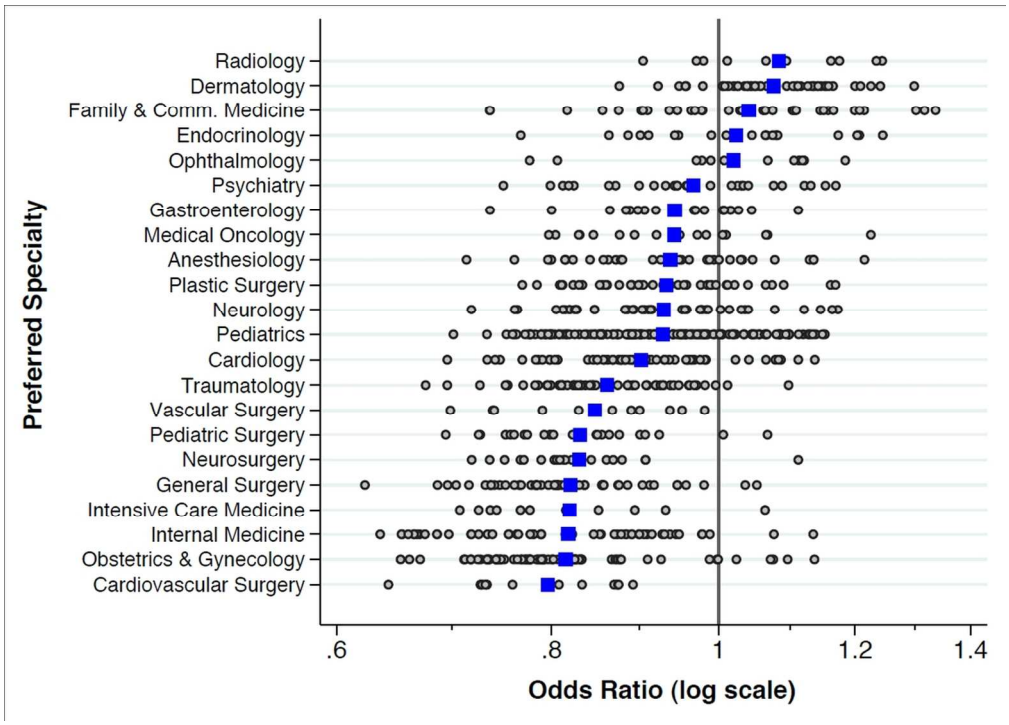

Effect of a 1-point increment in Lifestyle & Work Hours rating on odds ratio of preferring a specialty. Each point corresponds to an individual student. The points are classified by the student's preferred specialty. The blue squares show the mean effect for each preferred specialty. Not shown are preferred specialties with fewer than 10 respondents.
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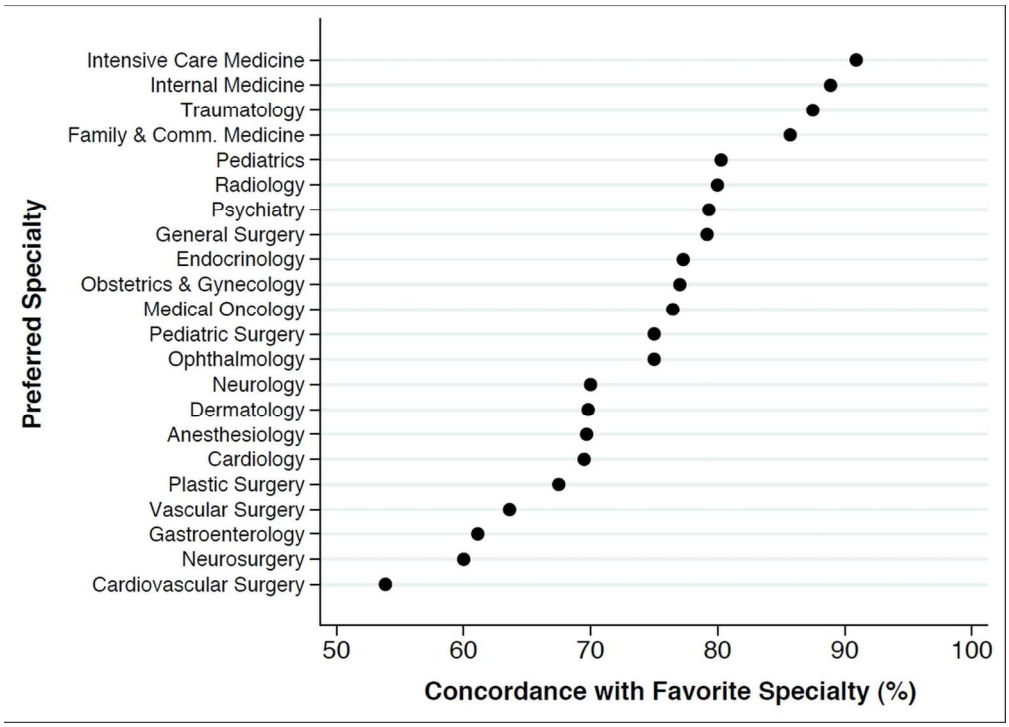

Concordance of preferred with favorite specialty. For each preferred specialty, the black points show the proportion of students who also designated that specialty as their favorite.
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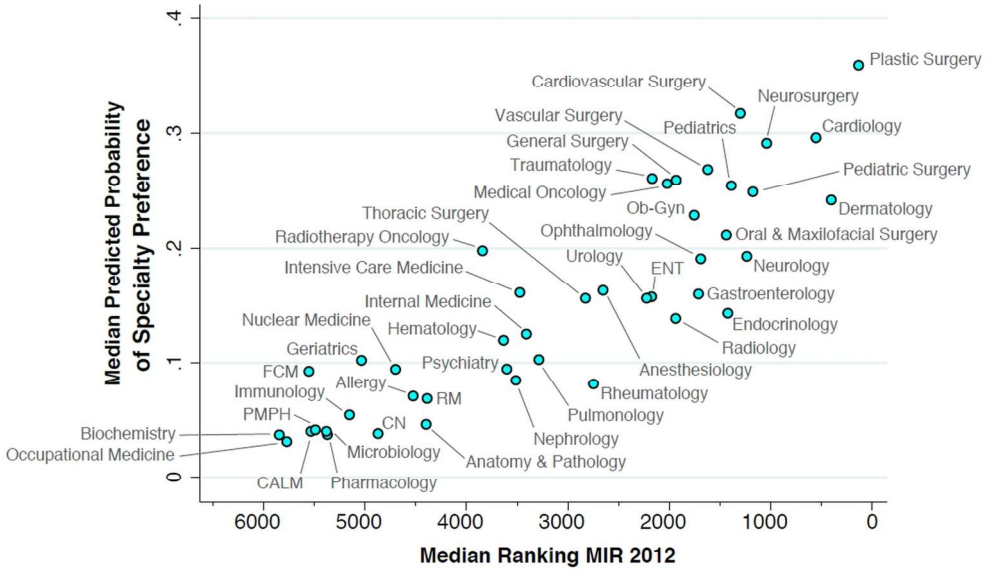

Median predicted probability of specialty preference in relation to the median specialty ranking in the 2012 MIR selection process. CALM = Clinical Analysis & Laboratory Medicine. CN = Clinical Neurophysiology. ENT = Otorhinolaryngology. FCM = Family and Community Medicine. Ob-Gyn = Obstetrics & Gynecology. PMPH = Preventive Medicine & Public Health. RM = Rehabilitation Medicine.
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Specialty choice in times of economic crisis: cross-sectional survey of Spanish medical students

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Abstract

Objective. To investigate the determinants of specialty choice among graduating medical students in Spain, a country that entered into a severe, ongoing economic crisis in 2008.

Setting. Since 2008, ~~when Spain entered into a severe, ongoing economic crisis,~~ the percentage of Spanish medical school graduates electing Family and Community Medicine (FCM) has experienced a reversal after more than a decade of decline.

Design. Nationwide cross-sectional survey ~~of all Spanish medical schools~~conducted online in April 2011.

Participants. We invited all students in their final year before graduation from each of Spain's 27 public and private medical schools to participate. ~~978 responding medical students in their last year before graduation.~~

Main outcome measures. Respondents' preferred specialty in relation to their perceptions of: (1) the probability of obtaining employment; (2) lifestyle and work hours; (3) recognition by patients; (4) prestige among colleagues; (5) opportunity for professional development; (6) annual remuneration; and (7) the proportion of the physician's compensation from private practice.

Results. 978 medical students (25% of the nationwide population of students in their final year) participated. ~~Job security~~Perceived job availability had the largest impact on specialty preference. Each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% CI, 27.2% – 40.5%). Job ~~security~~ availability was 4 times as important as compensation from private practice in determining specialty choice (95% CI, 1.7–6.8). We observed considerable heterogeneity in the influence of life style and work hours, with students

who preferred such specialties as Cardiovascular Surgery and Obstetrics & Gynecology valuing longer, rather than shorter workdays.

Conclusions. In the midst of an ongoing economic crisis, job ~~security~~ availability has assumed critical importance as a determinant of specialty preference among Spanish medical students. In view of the shortage of practitioners of Family and Community Medicine, ~~Public~~ public policies that take advantage of the enhanced perceived job ~~security~~ availability of FCM may help steer medical school graduates into this specialty.

Introduction

During the past two decades, researchers have carried out numerous studies of the determinants of specialty choice,[1-37~~1-28~~] While most have been conducted in the United States,[1-13 16 18 19 22 24 25~~1-13 16 18 19 22 24 26~~] others have addressed the determinants of specialization in Canada,[14 17 21 23 32~~14 17 21 23~~] Australia,[15 35~~15 25~~] the United Kingdom,[20 26 30 34~~20 27~~] Ireland,[29] France,[27 36] Finland,[31] Germany,[33] Spain,[37] and Japan.[28~~28~~] In view of growing concerns about a shortage of generalists, many studies have focused on the decision to seek a career in primary care,[2 4-6 18 25~~2 4-6 18 26~~] family medicine,[14 32~~14~~] general practice,[15 20 33 35~~15 20 25~~] internal medicine,[22 24~~22 24~~] pediatrics,[30] and general surgery.[9 13 16 19 23 29 34~~9 13 16 19 23~~]

An extensive list of factors influencing specialty choice has been considered, including: financial remuneration,[1-6 8-15 17 19 24 35~~1-6 8-15 17 19 24 25~~] life style and work hours,[1 2 4-16 19 21-24 29 33 35-37~~1 2 4-16 19 21-25~~] prestige among colleagues or the general public,[1-5 9 10 13-15 19 25 37~~1-5 9 10 13-15 19 26~~] mentors and other role models,[1 5 7 15 16 18 19 21 23 31 34 36~~1 5 7 15 16 18 19 21 23 32 33~~] the length of the residency training program,[1 3 5 12 13 15 16 32~~1 3 5 12 13 15 16~~] the clinical

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clerkship experience in medical school,[1 5 13 15 16 19 21 22 25 30~~1 5 13 15 16 19 21 22 26~~] direct patient interaction and continuity of care,[2-4 9 10 13 24 27 32 33 35~~2-4 9 10 13 24 25~~] debt upon graduation,[5 6 8 13 15 16 22 25~~5 6 8 13 15 16 22 26~~] research and teaching opportunities,[2 5 10 14 15 35~~2 5 10 14 15 25~~] potential for career advancement,[13 15 29 31~~13 15~~] influence of parents, relatives and peers,[4 5 15 32~~4 5 15~~] malpractice litigation risk,[8 9 15~~8 9 15~~] opportunity to perform procedures or work with new technology,[2 5 15 21 23~~2 5 15 21 23~~] intellectual challenge,[7 9~~7 9~~] and hospital versus ambulatory orientation.[2 23~~2 23~~] Gender differences in the importance of these factors have also been studied.[8 19-21 27-29~~8 19-21 28~~] ~~In the one study that considered job security, no significant effect was found.[9]~~

~~In the present study, we examine the determinants of specialty choice in Spain while the country remains in the midst of a severe financial crisis that began in late 2007.~~ In ~~a~~ 2011, we conducted a cross-sectional survey of Spanish medical students in their final year before electing a specialty training program~~, ,~~ ~~we confirm the importance of such factors as prestige, opportunity for professional development, and private sector remuneration.~~ In view of the severe, ongoing economic crisis that began in late 2008, ~~But~~ we ~~also find~~ studied whether ~~that job security~~the likelihood of obtaining employment ~~has~~ had assumed a key role in determining specialty preference.

Spain's Healthcare System and the Financial Crisis

The Spanish healthcare system is dominated by the public sector. In 2009, total healthcare expenditures constituted 9.5% of GDP, of which only 2.5% was privately financed. The vast majority of physicians are employees of the public sector, where salaries are fixed by separate negotiations between unions of healthcare workers and the

governments of each of Spain's 17 autonomous communities. Physicians in many specialties have opportunities to earn additional income in the private sector, either by treating paying patients in their own ~~consultancies~~ private practices or by performing consults on inpatients while on call~~via on-call coverage (termed guardias)~~ at private hospitals. However, ~~such opportunities are not available~~there is essentially no such demand for specialists in Family and Community Medicine (FCM), who work almost exclusively as full-time employees of health centers.

Medical specialization in Spain is governed by a system widely known as MIR, which stands for Médico Interno Residente, literally "resident medical intern."[~~38 39~~29 30] On an annual basis, the central government's Ministry of Health authorizes post-graduate training programs in 47 different specialties, imposing limits on the number of positions (plazas) in each program. Each medical school graduate (candidato) seeking a training position is ranked on the basis of his academic transcript and his score on the annual nationwide MIR examination. In a sequential process, the top-ranked applicant first chooses from all available training programs, after which each successively ranked candidate is permitted to choose from the remaining available training slots. In the 2011 MIR cycle, for example, the Ministry of Health authorized 6,881 positions in 560 training centers throughout the country.[40~~31~~] A total of 6,873 applicants accepted training positions through the sequential selection process.

Unemployment among graduates of Spanish medical schools was a relatively rare phenomenon until the financial crisis erupted in late ~~2007~~2008. With real gross domestic product in decline, the nationwide unemployment exceeding 10 percent and heading toward 20 percent, and interest rates on Spanish sovereign debt approaching record highs,

federal and regional governments began to engage in increasingly severe budgetary cutbacks. The healthcare sector was not immune from ~~increasingly severe governmental~~these budgetary ~~cutbacks in the ensuing years~~cuts. While established physicians with seniority had essentially lifetime government jobs, many younger graduates were compelled to accept contingent employment contracts. Still others could not find work at all. By February 2010, the number of ~~laid off~~out-of-work physicians nationwide had for the first time crossed the psychological threshold of 1,000.[41~~32~~] In the spring of 2011, when the survey described in this report was in the field, there were prominent headlines about personnel cuts in the health budgets of many autonomous communities, notably Catalonia.[42~~33~~] By April 2012, with increasing austerity measures, the number of unemployed physicians had broken the 2,000 barrier.[43~~34~~]

There is presumptive evidence that the financial crisis has had a significant effect on the career choices of recent medical school graduates. As Figure 1 indicates, the percentage of candidates participating in the annual MIR selection process who elected a training position in Family and Community Medicine underwent an abrupt reversal after 2008. For the past three years (2010–2012), the number of candidates electing FCM has been limited by the number of available training positions, whereas during 2006–2009, some training positions in FCM remained unfilled.

Subjects and Methods

Cross-sectional survey

In April 2011, with the assistance of professors, deans and student associations, we invited all students in their final year in each of the 27 medical schools of Spain to

participate in a survey of career preferences. Students were not contacted individually. Instead, posters advertising the survey and directing students to the survey web site were posted on every medical school campus. Participants were eligible to win a lottery prize. Participation in the survey was voluntary, and anonymity was assured. ~~Out of a total population of 3,874 registered sixth-year medical students nationwide, we received 978 responses (or 25%).~~ With the exception of students at the University of Las Palmas de Gran Canaria, who took the electronic survey as a classroom-based pilot, all respondents completed the survey online. ~~The response rate varied among medical schools, but there were no significant differences in the gender or age composition of the respondents and the entire nationwide population (survey respondents: 71% female, mean age 24.1 years; nationwide population of sixth-year students: 71% female, mean age 24.7 years). Participation in the survey was voluntary, and anonymity was assured. A brief description of the survey methods, along with some preliminary tabulations, have been reported elsewhere.~~[29]

Survey questionnaire

The electronic survey questionnaire contained three blocks: (1) personal data (age, sex, nationality, residential postal code, university, anticipated date of graduation, and how many parents or grandparents were physicians); (2) questions eliciting preferences among the 47 specialties in Spain's MIR system of postgraduate training; and (3) questions eliciting perceptions and expectations concerning these specialties.

In the second block, in particular, each student was first asked to designate his *preferred specialty*, that is, which specialty he would choose in the annual MIR selection

process if he faced no restrictions as a result of his academic performance or his score on the nationwide exam. Each student was then asked to designate his *favorite specialty*, that is, which specialty he enjoyed the most, without regard to remuneration or working conditions ("Sin tener en cuenta los aspectos económicos, condiciones laborales, etc., ¿cuál es la especialidad que más te gusta?"). ~~Among the 978 medical students responding to the survey, 892 (91.2%) designated a preferred specialty, of whom 836 (93.7%) also designated a favorite specialty.~~

In the third block, each student was presented with seven questions concerning each specialty within a limited menu of six specialties. The menu included the preferred specialty he had just chosen in the second block, the specialty of Family and Community Medicine, and four other specialties chosen at random from four balanced subsets. Each subset contained medical, surgical and diagnostic specialties, with one specialty in each quartile of the global ranking of specialties observed in the MIR 2010 selection cycle.[38~~29~~]

The seven questions, whose translated text appears in Table 1, addressed the following attributes of each specialty: (1) the probability of obtaining employment; (2) lifestyle and work hours; (3) recognition by patients; (4) prestige among colleagues; (5) opportunity for professional development; (6) annual remuneration for a physician with 10–15 years experience; and (7) the proportion of the physician's compensation from private practice. Four of the attributes (2, 3, 4 and 5) were measured on a 10-point scale, while two (1 and 7) were gauged on a percentage scale from 0 to 100. The remaining attribute (6) was measured in thousands of euros. We chose these seven attributes based upon our review of the literature and our discussions with experts knowledgeable about Spanish healthcare institutions. Inclusion of the first attribute, in particular, was

motivated by our hypothesis that the ongoing economic crisis and widely publicized budgetary cuts in the health sector had influenced students' perceptions about the likelihood of employment.

~~The translated text of each question, along the corresponding sample means and standard deviations of students' responses for FCM and for all remaining specialties combined, are given in Table 2. For all seven attributes, the differences in the mean ratings between FCM and other specialties combined were statistically significant ($P < 0.001$).~~

Statistical methods

We employed the mixed multinomial logit model[44~~35~~] to assess the influence of each of the seven attributes on students' choice of preferred specialty. The mixed multinomial logit model differs from the standard multinomial logit model in that the coefficients of each predictor variable may vary randomly in the population. In the context of discrete choice modeling, the mixed multinomial logit model captures the potential heterogeneity of individual preferences. For example, in the case of attribute 2, the mixed model admits the possibility that some students prefer a specialty with reduced work hours and a comfortable life style, while others prefer a specialty with long work hours and little leisure time.

In our application of the mixed multinomial logit model, the observations corresponded to the six specialties within the menus evaluated by each of the student respondents. For each student, the dependent variable was a binary indicator equal to 1 for the preferred specialty and 0 for the remaining five specialties in the student's menu.

The independent variables were each student's valuations of the seven attributes. In addition, we included interaction terms between each of the seven attributes and each personal characteristic in order to test whether the coefficients of the attributes differed by sex, age, university, expected graduation date, or the presence of physicians in the family. We also tested interactions between each attribute and a binary variable indicating concordance between the student's preferred and favorite specialty.

Adhering to the mixed logit specification, we further assumed that the coefficients of each attribute were normally distributed in the population with unknown mean and standard deviation. To assess whether there was significant heterogeneity in the coefficients of each attribute, apart from those differences attributable to the foregoing observed personal characteristics, we tested the null hypothesis that the estimated standard deviation of each coefficient's population distribution was equal to zero. We employed the chi-squared test based on the log likelihood ratio to assess the overall model goodness of fit.

To estimate our mixed multinomial logit model, we relied on the *mixlogit* routine in Stata 11 statistical software.[45~~36~~] Each raw coefficient outputted by this routine corresponds to the effect of a unit change in each attribute on the logarithm of the odds of preferring a specialty. Each raw coefficient can also be interpreted as the contribution of a unit change in each attribute to the "utility" of the specialty. In the tabulated results below, we report the exponentiated values of the raw coefficients, that is, the effect of a unit change on the odds of specialty preference. However, we used the raw coefficients to assess the quantitative tradeoffs between attributes. For example, to estimate the percentage increase in the proportion of the physician's compensation from private

practice (attribute 7) that would yield the same utility as a 1-percent increase in the probability of obtaining employment (attribute 1), we computed the ratio of the raw coefficient of attribute 1 to the raw coefficient of attribute 7.

Finally, to assess the external validity of our mixed multinomial logit model, we compared its predictions of specialty choice with the global ranking of specialties observed among the same nationwide cohort of medical graduates in the 2012 MIR selection process. We chose the 2012 MIR cycle for comparison because the students responding to our April 2011 survey subsequently graduated from medical school in June 2011, then studied for and took the MIR exam in January 2012, and then made their specialty selections during March of that year. Specifically, for each specialty within each student's menu, we computed the predicted probability that the student would prefer that specialty. For each specialty, we then compared its median predicted probability, as derived from our model, with its median ranking among all candidates who elected a specialty in the 2012 MIR cycle.

Results

Survey Response

Out of a total population of 3,874 registered sixth-year medical students nationwide, we received 978 responses (or 25%). These responses included students from each of Spain's 27 medical schools. While the response rate varied among medical schools, there were no significant differences in the gender or age composition of the respondents and the entire nationwide population (survey respondents: 71% female, mean age 24.1 years; nationwide population of sixth-year students: 71% female, mean age 24.7 years).

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Descriptive Statistics

Among the 978 medical students responding to the survey, 892 (91.2%) designated a preferred specialty, of whom 836 (93.7%) also designated a favorite specialty. For each of the seven questions, Table 1 shows the corresponding sample means and standard deviations of students' responses for FCM and for all remaining specialties combined. For all seven attributes, the differences in the mean ratings between FCM and other specialties combined were statistically significant ($P < 0.001$).

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Predictors of Specialty Preference

Table 2 gives the principal results of our regression analyses. Model 1 represents the standard multinomial logit regression, in which all attribute coefficients are fixed, while Models 2 through 4 represent mixed multinomial logit regressions. In Model 2, in particular, the coefficient of attribute 2 (lifestyle and work hours) is permitted to vary within the population. In Model 3, interaction terms with attribute 6 (annual remuneration with 10–15 years' experience) are included as explanatory variables. In Model 4, attribute 6 and its interactions are removed altogether. We omit the results of other models where we found insignificant interactions between each attribute and sex, age, university, expected graduation date, the presence of physicians in the family, as well as a binary variable indicating concordance between the student's preferred and favorite specialty.

In all model specifications in Table 2, attribute 1 (the probability of obtaining employment) significantly influenced specialty preference. In Model 4, for example, each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% confidence interval (CI), 27.2% – 40.5%).

The magnitude of the effect was comparable to that of attribute 5 (professional development, including the possibility of promotion). Attributes 3 (recognition by patients) and 4 (prestige among colleagues) had smaller but significantly positive influences on specialty choice. For both attributes, a 1-point increment on a 10-point scale increased the odds of preferring a specialty by approximately 10–11 percent. The findings of Model 4 were not significantly altered when we included an interaction term for students at the University of Las Palmas de Gran Canaria, who took the electronic survey as a classroom-based pilot. (Results not shown.)

Heterogeneity of Preferences for Life Style and Work Hours

Although attribute 2 (life style and work hours) appeared to have a significant negative influence on specialty choice, our mixed multinomial logit Models 2, 3 and 4 revealed considerable population heterogeneity in this effect. In Model 4, for example, the population average effect was 0.907, with a 1-standard deviation range from 0.606 to 1.208 (that is, 0.907 ± 0.301). Equivalently, a 1-point increment on a 10-point scale reduced the odds of preferring a specialty *on average* by an estimated 9.3 percent. However, for 68 percent of the students (which corresponds to the 1-standard deviation range for a normal distribution), the effect of a 1-point increment ranged from a 39.4 percent decrease to a 20.8 percent increase in the odds of preferring a specialty. Attribute 2 was the only explanatory variable to show significant population heterogeneity in our mixed multinomial logit regressions.

Figure 2 offers a visual representation of the population heterogeneity in the influence of lifestyle and work hours. ~~To construct the figure, we used the results of~~

~~Model 4 to compute the predicted effect for each individual student of a 1-point increment in attribute 2.~~ Each open point in the figure represents one student. The points are arranged in rows corresponding to the student's preferred specialty. ~~The horizontal axis gauges the predicted effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours. The solid blue squares represent the population mean effect for each preferred specialty.~~ Among the 887 students included in Model 4, a total of 231 (or 26 percent) had a positive predicted effect of lifestyle and work hours on specialty preference.

Figure 2 displays considerable heterogeneity between preferred specialties. For example, among the group of 53 students preferring Dermatology, whose predicted effects are arrayed in the second row in Figure 2, the average effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours was a 7.6-percent increase in the odds of preferring that specialty (corresponding to the solid blue square in the second row). Within this group, the predicted effect ranged from a 12.5-percent decrease to a 29.9-percent increase. For the 35 students preferring Family and Community Medicine, arrayed on the third row, the average effect of a 1-point increment along the scale of lifestyle and work hours was a 4.1-percent increase in the odds of specialty preference (corresponding to the solid blue square in the third row), with a predicted effect ranging from a 26.4-percent decrease to a 33.6-percent increase. By contrast, among the group of 73 students preferring Obstetrics & Gynecology, whose predicted effects are arrayed in the next-to-last row of the figure, the average effect of a 1-point increment was an 18.5 percent decrease in the odds of preferring that specialty

(the next-to-last solid blue square). Within this group, the predicted effect ranged from a 34.6-percent decrease to a 13.7-percent increase.

Concordance between Preferred and Favorite Specialties

Among the 892 students who reported both a preferred and a favorite specialty, we observed a concordance between the two responses in 676 students (or 75.8%). Figure 3 shows the rate of concordance, classified by preferred specialty. The rate of concordance ranged from a low of 53.8 percent among students who preferred Cardiovascular Surgery to 90.9 percent among those who preferred Intensive Care Medicine. The rate of concordance for Family and Community Medicine was 85.7 percent.

Opportunities for Private Sector Remuneration

In Models 1 and 2 in Table 2, attribute 6 (annual remuneration with 10–15 years experience) had a significant negative influence on specialty preference, while attribute 7 (proportion of compensation from private practice) had a significant positive effect. To address the apparent inconsistency between the estimated effects of the two different attributes, we included interaction terms with attribute 6 in our specification of Model 3. We found that the negative relation between annual remuneration and specialty preference remained statistically significant for female students and for those who reported a concordance of preferred and favorite specialty. There was no relationship between the effect of annual remuneration and a student's age.

Finally, in Model 4, when we dropped attribute 6 altogether, the effect of attribute 7 remained significant and positive, but its magnitude was decreased. With annual

remuneration included as an explanatory variable, each 10-percent increment in the proportion of compensation from private practice increased the odds of preferring a specialty by approximately 20–22 percent. With annual remuneration excluded, the effect of 10-percent increment in the proportion of compensation from private practice compensation increased the odds of specialty preference by only 7 percent.

Tradeoff between Job ~~Security~~ Availability and Opportunities for Private Sector Remuneration

We focused specifically on the quantitative tradeoff between job ~~security~~ availability (attribute 1) and opportunities for private sector remuneration (attribute 7). Relying on the results of Model 4, we found that the raw coefficients of attributes 1 and 7 were, respectively, 0.290 (95% CI, 0.241− 0.340) and 0.069 (95% CI, 0.028−0.110). The percentage increase in the proportion of the physician's compensation from private practice (attribute 7) that would yield the same utility as a 1-percent increase in the probability of obtaining employment (attribute 1) was therefore 0.290 •0.069 = 4.2. Based on a linear approximation of the variance of the ratio of two random variables, we computed the 95% confidence interval around this estimate as 1.7−6.8.

External Validity: Comparison with MIR 2012 Global Rankings

For all four models, the chi-squared statistic based on the log likelihood ratio showed a significant goodness of fit ($P < 0.002$). As a further check of internal validity, we found a close match between the observed and predicted probabilities of specialty choice when broken down by decile of predicted probability.[46~~37~~]

Figure 4 displays a check of external validity. For each specialty, the figure plots median predicted probability of specialty preference against the median specialty ranking in the 2012 MIR cycle. The latter variable is plotted on a reverse scale since the most preferred specialties in the MIR selection process will have the lowest ranking numbers. Also plotted is the ordinary least squares regression line relating the two variables. The Spearman rank correlation between the two variables was –0.88 and highly significant ($P < 0.0001$).

The strong correlation between the model predictions and the MIR rankings can be seen through a comparison of Cardiology at the upper right, Anesthesiology near the center, and Family and Community Medicine (FCM) near the bottom left. Thus, among the 6,704 candidates nationwide who elected a specialty during the 2012 MIR selection process, the median ranking of those candidates choosing Cardiology was 555. (Only two specialties had a higher median ranking: Plastic Surgery at 136, and Dermatology at 404.) From a menu of six specialties offered to students participating in our survey, the median predicted probability of preferring Cardiology was 29.6 percent. For Anesthesiology, by contrast, the median ranking in the 2012 MIR cycle was 2,652, while the median predicted probability among survey respondents was 16.3 percent. For Family and Community Medicine, the median ranking in the 2012 MIR cycle was 5,552, while the median predicted probability among survey respondents was 9.2 percent.

Discussion

In a cross-sectional survey of medical students in their final year before graduation, conducted in the midst of Spain's economic crisis, we found that job ~~security~~ availability

had significant impact on the specialty preference. Based upon our Model 4 specification, we found that each 10-percent increment in the probability of obtaining employment increased the odds of preferring a specialty by 33.7 percent (95% CI, 27.2% – 40.5%). Moreover, we observed considerable variability in the effect of lifestyle and work hours on students' specialty preferences. Among students who would elect Dermatology if there were no restrictions on specialty choice, the average effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours was a 7.6-percent increase in the odds of preferring that specialty. By contrast, among students preferring Obstetrics & Gynecology, the average effect of a 1-point increment was an 18.5 percent decrease in the odds of preferring that specialty.

We also asked students to designate their favorite specialty, that is, the specialty that they enjoyed the most, independent of future remuneration or working conditions. The concordance between students' preferred and favorite specialties varied considerably. Approximately 54 percent of students who preferred Cardiovascular Surgery also designated it as their favorite specialty. By contrast, approximately 86 percent of students who preferred Family and Community Medicine also designated it as their favorite specialty, while 91 percent of students who preferred Intensive Care Medicine also designated it as their favorite specialty.

Our survey included two attributes that reflected different aspects of physician compensation: the average remuneration of a physician with 10–15 years experience, and the proportion of compensation from private practice. We found that the former had an unexpectedly negative relation to specialty preference, particularly among female students and those favorite specialty matched their preferred specialty, while the latter

had a significant positive relation to specialty preference (Model 3). Eliminating the former from our regression analysis (Model 4), we estimated the tradeoff between job security and opportunities for private practice. An increase of approximately 4 percent in the proportion of the physician's compensation from private practice would yield the same utility as a 1-percent increase in the probability of obtaining employment.

Finally, as an external validity check, we found a high correlation between the specialty ranking predicted by our mixed multinomial logit model with the nationwide specialty ranking in the 2012 MIR selection process. In particular, the median probability that a student would select Family ~~&~~ and Community Medicine out of a menu of six specialty choices was approximately 9 percent, while the median MIR ranking of this specialty was 5,552 out of 6,704 candidates.

Study Limitations

Our study has a number of important limitations. To begin with, our survey sample of 978 respondents constituted only 25% of the entire nationwide population of 3,874 registered students in their final year of medical school. While our sample covered all 27 of Spain's medical schools, and while we found no significant difference in gender or age composition between our sample and the entire nationwide population, the apparently low response rate raises the possibility that our conclusions cannot be generalized or are subject to non-response bias.

Open-ended online surveys generally yield much lower response rates than a direct personal invitation via postal mail accompanied by a paper questionnaire.[47] In particular, surveys of specialty choice among students in a single medical school or

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clinical rotation have yielded high response rates ranging from 65 to 97 percent.[4 5 7 9 13 28-30 34 37] By contrast, an Internet-based survey soliciting participation of students in 70 U.S. medical schools received online responses from students in only 16 schools.[16] An online survey covering students in all five medical schools in the federal state of Baden-Wuerttemberg in Germany yielded only 11% of eligible students.[33] A recent online survey of students taking the 2011 National Grading Examination in France yielded a 24% response rate.[36]

Despite the low response rate, our Internet-based survey achieved wide coverage at low cost. It is at least arguable that the conclusions from our sample of 978 students from all 27 of Spain's medical schools are more generalizable than a hypothetical study of a 100-percent sample of 978 students from a single medical school. Nor do we have any evidence of significant non-response bias. Students at the University of Las Palmas de Gran Canaria, who took the survey as a classroom pilot and had a higher response rate, nonetheless placed the same valuation on job availability as those who look the survey online.

An additional limitation of our study is the lack of prior survey results for comparison. ~~To begin with, w~~We surveyed students only once in April 2011. We have no data from a comparable cross-sectional survey carried out before the onset of Spain's economic crisis in late ~~2007~~2008. Our results are at least consistent with the finding from a 2009 survey in Ireland – carried out in the midst of the country's financial crisis – that medical students and junior doctors attached high importance to "future employment" in specialty choice.[29] A 2010 survey of all first- through sixth-year medical students from a single Spanish medical school found that "quality of life" and "professional prestige"

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were important factors in specialty choice, but aspects of job security were not considered.[37] Further confirmation of the lasting importance of job security in specialty choice will require repeat surveys once employment prospects for physicians have improved.

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Nor do we report longitudinal follow-up data on the evolution of our respondents' specialty preferences over time. There is evidence from longitudinal studies that students' specialty preferences evolve during medical school.[48 49~~38 39~~] In a study of internal medicine residents in the United States, 62 percent changed the subspecialty career choice at least once during residency.[50~~40~~] In a longitudinal follow-up of U.K. medical graduates 10 years after graduation, approximately one-quarter were working in a specialty different from that chosen 3 years after graduation.[26~~27~~] It is notable, however, that 91.2% of students that we surveyed reported a preferred specialty, whereas in the United Kingdom, 28% of medical school graduates in the 1990s knew their preferred specialty one year after graduation.[26~~27~~] The high correlation between specialty choice predicted by our model and specialty choices observed in the MIR 2012 cycle (Figure 3) does not suggest a marked shift in preferences during the one-year period after medical school graduation, during which prospective candidates study for the national exam and then participate in the sequential selection process.

The explanatory variables in our model (Table 1) were derived from students' perceptions and expectations, rather than objective data. It is entirely possible, for example, that students exaggerated the importance of job security (attribute 1). By April 2012, with Spain's overall unemployment rate hovering around 25%, the psychologically menacing figure of 2,000 unemployed doctors[51~~41~~] still represented only 1 percent of the

active physician workforce. While a few studies have correlated specialty preferences with objective data on remuneration, work hours, malpractice risk, and debt upon graduation,[8 12~~8 12~~] we stress that students' subjective perceptions and expectations are the principal determinants of specialty choice.

While a number of studies have focused on the "controllable lifestyle" as an important determinant of specialty choice,[1 2 4-16 19 21-24 52~~1 2 4-16 19 21-25~~] our results shed new light on the heterogeneity of preferences for lifestyle and work hours. We find, in fact, that only 26 percent of respondents placed a positive value on reduced work hours, while 74 percent placed a positive value on working more (as shown by the distribution of points in Figure 2). One possible explanation is that, in a healthcare system where public-sector salaries are fixed by collective bargaining, taking on additional on-call assignments after regular working hours is viewed primarily as a means of increasing remuneration. In the EuroStat Labor Force Surveys, Spanish physicians reported working an average of 39 hours per week,[53~~42~~] even though the collectively agreed-upon formal work week was 35 hours.

Our failure to find a significant positive effect of annual remuneration (attribute 6) may reflect students' inadequate knowledge of physicians' salaries, a phenomenon that has also been observed in the U.S.[54~~43~~] It is possible that students' estimates of remuneration were overly influenced by short-term concerns about job security, even though the underlying question was framed over a 10–15 year horizon. Nationally representative data on the earnings of Spanish physicians have not been published. Students' estimates of the annual remuneration of a non-FCM specialist were on average

44% greater than that of a practitioner of FCM (Table 1), a value that falls within the range of specialist-GP remuneration ratios of other OECD countries.[5544]

In Canada, physicians' fee-for-service payments correlate strongly with income,[1717] whereas in the United Kingdom, opportunities for non-NHS consultant work constitute an important determinant of variations in income.[5645] Our finding that attribute 7 was a significant predictor of specialty choice indicates that, in Spain's healthcare system where publicly financed salaries are the dominant form of physician compensation, opportunities for additional private-sector employment are a more sensitive proxy for physician income. For this reason, we based our calculations of the tradeoff between job security and remuneration on the results of Model 4, which excludes attribute 6 entirely.

A few studies have employed a discrete choice experiment – rather than a cross-sectional survey – to assess the determinants of physicians' choice of specialty,[3525] working conditions,[56 5745 46] and urban versus rural practice.[5847] A discrete choice experiment has the advantage that each potential determinant of physician choice can be independently controlled and varied randomly. In principle, such a study design might have helped us distinguish more precisely between total remuneration (attribute 6) and opportunities for private sector employment (attribute 7). It might also have allowed us to assess more precisely the extent to which the "workaholics" in our study, who preferred specialties with more working hours (attribute 2), would trade off higher income for reduced leisure time. One drawback of the discrete choice experimental design is that respondents choose between hypothetical choices constructed by the experimenter, whereas in our cross-sectional study, we directly observe the perceived attributes of the

actual specialty options available to graduating medical students. While the results of discrete choice experiments can be used in simulations, our cross-sectional design thus facilitates external validation of our results (Figure 4).

We asked students to report both their preferred and favorite specialties, a distinction we have not encountered in any other study. While Spanish medical students generally report a high level of concordance between the two (76%), we observed considerable variation by preferred specialty (Figure 2). It is noteworthy that five of the highest ranked specialties in the 2011 MIR cycle (Cardiovascular Surgery, Neurosurgery, Plastic Surgery, Cardiology and Dermatology; see Figure 4) had low levels of concordance. By contrast, the observed high levels of concordance for Internal Medicine and Family and Community Medicine suggest that students who prefer these specialties do so despite the low salaries, minimal opportunities for private-sector remuneration, or unfavorable working conditions. This conclusion is further supported by the observed negative effect of the interaction between concordance and remuneration in Model 3 (Table 2).

Policy Implications

Increased remuneration, more favorable working conditions and enhanced prestige have routinely been proposed as incentives to lure medical students into primary care and family practice. In Spain, however, physician remuneration within the public sector is determined by decentralized collective bargaining between unions and local governments. Opportunities for practitioners of Family and Community Medicine~~primary care and family practice physicians~~ to earn additional income in the private sector are

scarce and even less under the control of the central government. Improvements in working conditions and enhancement of prestige are longer-term solutions that will require reformulation of the nature of work of the primary care physician and the role of community health centers.[38 3929 30]

Our findings, by contrast, suggest other shorter-term policy levers that may take advantage of the high level of perceived job ~~security~~ availability of FCM (Table 1) and thus increase the flow of medical school graduates into the field. To the extent that the healthcare budgets of the country's 17 autonomous communities must continue to endure budgetary cuts, our results argue for sparing community health centers and the practitioners of FCM who work in them. As part of its crisis management, the Spanish central government has recently increased physicians' legal work week from 35 to 37.5 hours, a measure that has sparked more than a few protests.[59 6048 49] Ironically, this measure will cut mostly into the incomes of non-FCM specialists who earned additional income through after-hours ~~guardias~~ private consultations and thus reduce the income disparity with ~~family~~ FCM physicians.

As a separate policy instrument, the central government's Ministry of Health could cautiously expand the number of approved post-graduate training positions in FCM, which has recently become a limiting factor in the resurgence of this specialty since 2008 (Figure 1). There is evidence that many residents already in training in FCM have chosen to retake the national MIR exam and reenter the selection process as candidatos despite the requirement that they abandon their current training position.[3829] It is conceivable that too large an excess of unfilled training slots in FCM could aggravate this perverse incentive.

Conclusions

In the midst of an ongoing economic crisis, ~~job security~~the likelihood of obtaining employment has assumed critical importance as a determinant of specialty preference among Spanish medical students. Public policies that take advantage of the enhanced perceived job ~~security~~ availability of FCM may be an effective way to steer medical school graduates into this specialty.

Footnotes

Contributors

All authors (JEH, BGL, VOR, PBP) contributed substantially to the conceptualization and design of the survey. JEH, BGL and PBP performed statistical analyses on the survey data. JEH and BGL wrote the initial drafts, while VOR and PBP made substantive changes to various drafts. All contributors approved the final version for publication.

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Competing Interests

All authors have completed the United Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that they have no competing interests.

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Statement concerning Ethical Approval

No ethical approval was required for this research.

Data Sharing Statement

The detailed results of all statistical analyses, including statistical code, are available from the corresponding author at jeffrey@mit.edu.

Article Summary

Article focus.

- Ours is the first comprehensive study of the determinants of physician specialty choice in Spain, a country whose healthcare system is dominated by the public sector.
- Since 2008, when Spain entered into a severe, ongoing economic crisis, the percentage of Spanish medical school graduates electing Family and Community Medicine (FCM) has experienced a reversal after more than a decade of decline.
- In an April 2011 nationwide cross-sectional survey of graduating students from all Spanish medical schools, we focus on ~~job security~~the likelihood of obtaining employment as a determinant of physician specialty choice.

Key messages.

- We find that job ~~security~~ availability has assumed a key role in determining specialty choice.
- We confirm the importance of such factors as prestige, opportunity for professional development, and private sector remuneration.
- In contrast to prior studies, we find wide variation in the importance that Spanish medical students attach to a controllable life style and reduced work hours.

Strengths and limitations of this study.

- Our findings suggest policy levers that may take advantage of the high level of perceived job security of Family and Community Medicine and thus increase the flow of medical school graduates into the field.

- In the present study, we use online survey methods to achieve wide coverage of all 27 of Spain's medical schools at the expense of a reduced response rate. Moreover, we do not report longitudinal follow-up data on our respondents' specialty preferences over time.

Table 1. Seven survey questions on attributes of medical specialties [a]

	Attribute and Survey Text	FCM Mean *S.D.*	All Others Mean *S.D.*
1	*Probability of Obtaining Employment.* "How would you rate the probability of obtaining work in the next three years, whether in the public or private sector, for an individual who became certified in this specialty today? (0 to 100 percent)"	83.98 *19.89*	64.78 *23.92*
2	*Lifestyle & Work Hours.* "Work hours, working conditions, and the ability to reconcile work with family life. (0 to 10, 0 = very bad, 10 = very good)"	7.78 *2.09*	6.78 *2.25*
3	*Recognition by Patients.* "Recognition of professional work on the part of patients. (0 to 10)"	5.92 *2.60*	6.34 *2.73*
4	*Prestige among Colleagues.* "Prestige and recognition among colleagues as well as social recognition. (0 to 10)"	3.92 *2.28*	6.30 *2.52*
5	*Opportunity for Professional Development.* "Possibility of promotion or future professional development within the specialty (new fields, new techniques, scientific advances). (0 to 10)"	5.11 *2.30*	7.20 *2.15*
6	*Annual Remuneration with 10–15 Years Experience.* "Estimate the current average annual gross remuneration (public and private combined) of a specialist with 10–15 years of experience. (Thousands of euros)" [b]	60.00 *0.16*	86.56 *31.96*
7	*Proportion of Compensation from Private Practice.* "What percentage of this remuneration (including public and private) do you believe comes from private practice? (0 to 100 percent)" [b]	0.00 *0.00*	39.32 *23.40*

a. The introductory text was, "In this section, you'll define your profile of some medical specialties, including the one that you've just chosen as your first choice as well as others chosen at random. Think about your *perceptions and expectations* concerning each specialty."
b. The preamble to the two questions on attributes 6 and 7 was: "The following questions are about compensation. To facilitate your responses, recall that the average annual gross income of a full-time specialist in Family & Community Medicine with 10–15 years experience is currently about 60,000 euros."

Table 2. Mixed Multinomial Logit Regression Results [a]

Explanatory Variable	Model 1	Model 2	Model 3	Model 4
1. *Probability of Obtaining Employment* [b]	1.324 [1.263 , 1.388]	1.346 [1.278 , 1.418]	1.339 [1.271 , 1.412]	1.337 [1.272 , 1.405]
2. *Lifestyle & Work Hours*	0.905 [0.867 , 0.944]	0.901 [0.852 , 0.952]	0.891 [0.843 , 0.943]	0.907 [0.860 , 0.957]
Population Standard Deviation		0.288 [0.161 , 0.415]	0.282 [0.155 , 0.409]	0.301 [0.182 , 0.419]
3. *Recognition by Patients*	1.105 [1.055 , 1.157]	1.118 [1.064 , 1.176]	1.116 [1.061 , 1.173]	1.098 [1.047 , 1.151]
4. *Prestige among Colleagues*	1.082 [1.024 , 1.143]	1.096 [1.033 , 1.163]	1.110 [1.046 , 1.179]	1.062 [1.005 , 1.121]
5. *Opportunity for Professional Development*	1.326 [1.254 , 1.403]	1.347 [1.267 , 1.432]	1.347 [1.265 , 1.433]	1.303 [1.229 , 1.381]
6. *Annual Remuneration with 10–15 Years Experience* [c]	0.821 [0.782 , 0.863]	0.812 [0.770 , 0.856]	1.062 [0.701 , 1.610]	
Interaction: *Female Gender*			0.884 [0.817 , 0.957]	
Interaction: *Concordance with Favorite Specialty* [d]			0.885 [0.815 , 0.962]	
Interaction: *Age (Years)*			0.995 [0.978 , 1.012]	
7. *Proportion of Compensation from Private Practice* [b]	1.195 [1.139 , 1.255]	1.210 [1.148 , 1.276]	1.218 [1.154 , 1.285]	1.071 [1.028 , 1.116]
Number of respondents [e]	836	836	818	887
Number of observations [f]	4,839	4,839	4,738	5,184

a. The coefficients represent the effect of a unit change in the independent variable on the odds of preferring a specialty. Numbers in brackets below each coefficient are 95% confidence intervals.
b. Attribute values normalized to range from 0 to 10, so that each unit corresponds to 10 percent.
c. Attribute values normalized so that each unit corresponds to €10,000.
d. Binary variable equal to 1 when the student's preferred specialty is also his favorite specialty.
e. Number of students with data on all explanatory variables in the model.
f. Number of specialty choices with data on all explanatory variables in the model.

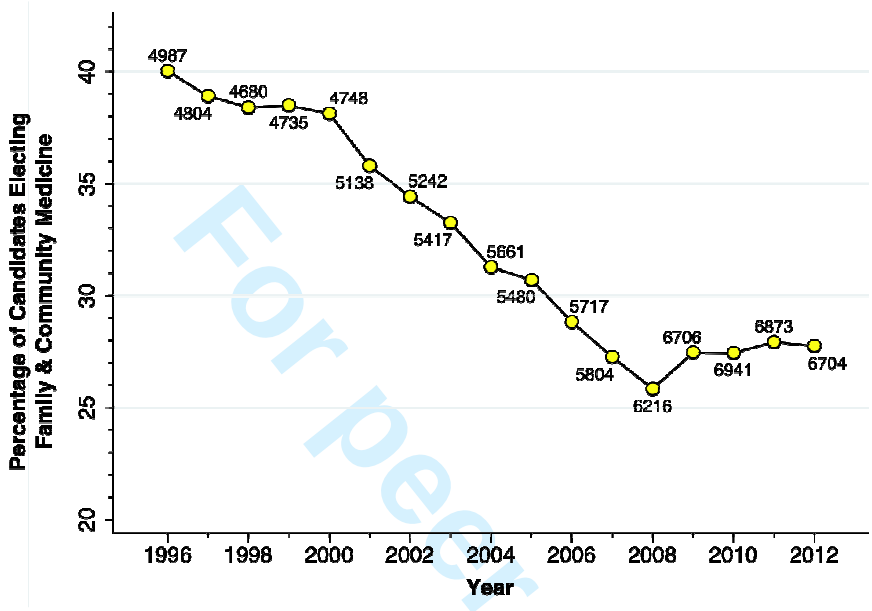

Figure 1. Percentage of Candidates Participating in the Annual Internship-Residency ("MIR") Selection Process Who Elected a Training Position in Family and Community Medicine, 1996–2012. Adjacent to each point is the total number of candidates participating in the MIR selection process in the corresponding year. *Source:* Compiled from annual data provided by the Ministerio de Sanidad y Política Social, Subdirección General de Ordenación Profesional, Spain.

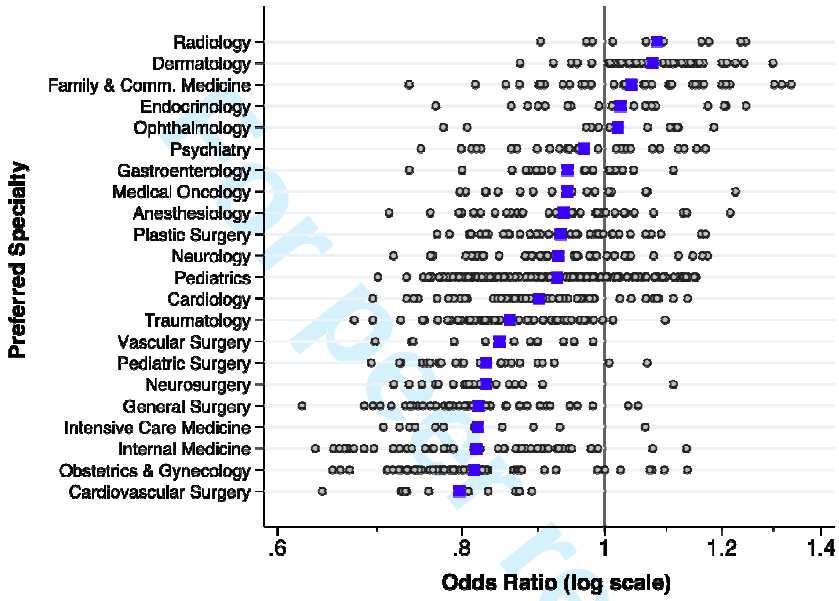

Figure 2. Effect of a 1-point increment in *Lifestyle & Work Hours* rating on odds ratio of preferring a specialty. We used the results of Model 4 to compute the predicted effect for each individual student of a 1-point increment in attribute 2 (Lifestyle & Work Hours). Each open point in the figure represents one student. The points are arranged in rows corresponding to the student's preferred specialty. The horizontal axis gauges the predicted effect of a 1-point increment a 10-point scale of favorable lifestyle and work hours. The solid blue squares represent the population mean effect for students in each preferred specialty. ~~Each point corresponds to an individual student. The points are classified by the student's preferred specialty. The blue squares show the mean effect for each preferred specialty.~~ Not shown are preferred specialties with fewer than 10 respondents.

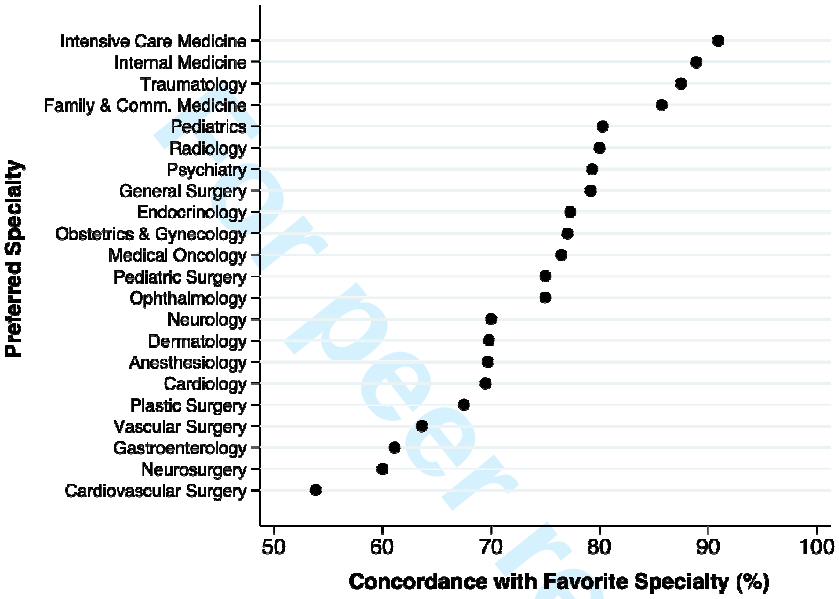

Figure 3. Concordance of preferred with favorite specialty. For each preferred specialty, the black points show the proportion of students who also designated that specialty as their favorite.

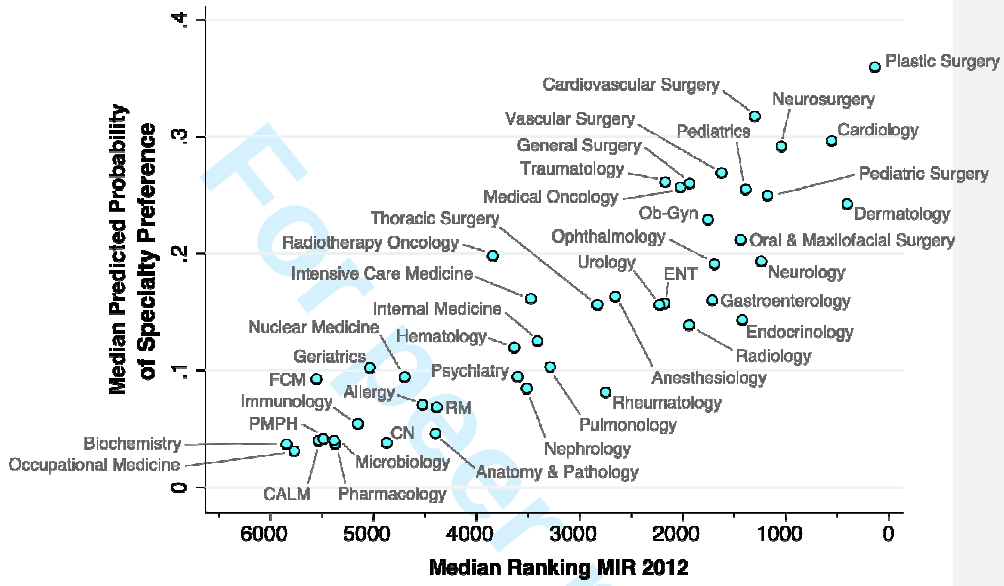

Figure 4. Median predicted probability of specialty preference in relation to the median specialty ranking in the 2012 MIR selection process. CALM = Clinical Analysis & Laboratory Medicine. CN = Clinical Neurophysiology. ENT = Otorhinolaryngology. FCM = Family and Community Medicine. Ob-Gyn = Obstetrics & Gynecology. PMPH = Preventive Medicine & Public Health. RM = Rehabilitation Medicine.

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