

EVALUATING THE TWO-BODY PROBLEM: JOINT-HIRE PRODUCTIVITY WITHIN THE UNIVERSITY

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Abstract

Academic “dual-career” couples make up an increasing share of the academic labor force. We compare the research productivity of joint hires to traditional (single) hires at Washington State University from 2005-2014. We find that joint hires have a greater number of annual research publications than their peers, on average. Furthermore, “secondary” hires (those who are hired as part of an accommodation) are no less productive than their colleagues. These findings are consistent with a model in which some couples value staying together (which often means working at the same institution in rural settings) but institutions evaluate each member of a couple independently when making hiring decisions. Thus, couples of mixed productivity tend to be matched at institutions that reflect the weaker candidate’s expected productivity.

Keywords: Labor markets; Academic Couples; Joint Hiring; Dual-Career; Productivity; Two-Body Problem; Higher Education

JEL Classification Numbers: I23, J20, J21, J24, J44, J49

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1 Introduction

Working couples often face the challenge of finding a job for each partner in the same geographic location. This challenge is especially poignant for those in academia. Researchers estimate that seventy-two percent of individuals employed in academia are part of a working couple (Scheibinger, Henderson, and Gilmartin 2008). Half of those – or 36 percent of all academics – have a partner who is also in academia. These “dual-career” academic couples face an especially difficult job search because academic institutions in the U.S. are often geographically isolated.

To remain competitive in an environment in which an increasing share of candidates are part of a couple, many universities have adopted official partner accommodation policies that allow greater flexibility in finding a position for the partner of a desired candidate.¹ A commonly cited concern with joint hiring through these policies is the stigma of “less good” that may be attached to the partner hire because that person was not recruited through the traditional method (Scheibinger, Henderson, and Gilmartin, 2008). However, little work has been done thus far to rigorously sort out the effects of the presence of and hiring practices related to academic couples on the distribution of faculty quality from either a theoretical or empirical perspective.²

Our research question is, “How does the productivity of individuals hired as part of a couple compare to their colleagues within the same institution?” We note two separate phenomena that are likely to influence how academic couples are matched with institutions (and thus affect the distribution of quality within those institutions). The first of these deals with the *supply* of couples to institutions: it is the willingness of partners in some academic couples to accept an offer from a less prestigious school in order to be near her partner (McFall and Murray-Close, 2015). In a survey of over 9,000 academics, Scheibinger, Henderson, and Gilmartin (2008) found that more than 20 percent of the couples in the sample reported such

¹ See Wolf-Wendel, Twombly, and Rice (2004) for a thorough discussion of the various types of policies that exist.

² Guler, Guvenen, and Violante (2012) demonstrate that dual-career job searchers face both increased opportunities (due to the ability to pool risk) and challenges (due to co-location) in finding employment. A large empirical literature generally finds that women’s careers generally suffer relative to men’s when couples migrate (for a review, see McFall and Murray-Close, 2015). Kojima, Pathak, and Roth (2013) note that the presence of couples in labor markets may preclude a stable matching between employers and employees. In practice, however, stable matchings are likely when the number of couples and preference lists are small relative to the size of the market. Costa and Kahn (2000) and Li (2009) analyze the effects of dual-career couples and dual-career academic couples, respectively, on the geographic distribution of the labor force and both find that couples – whether academic or otherwise – are more likely to migrate towards cities where employment opportunities are more abundant (a different interpretation of this phenomenon is provided by Compton and Pollack, 2007, however). Since academic institutions are often geographically isolated (at least in the U.S.), a couple’s ability to find suitable employment for both partners in a city may be limited.

behavior. This has the potential to alter the distribution of faculty quality from what would be seen if all candidates behaved as if they were single.

The second phenomenon concerns the *demand* for couples by institutions. Institutional partner accommodation policies are designed to provide a position in which timing or mismatch of specialty might otherwise prevent the hire from occurring (we detail the formal accommodation policy of the institution evaluated in this study, Washington State University, or WSU, below). However, this does not imply that universities are willing to hire lower-quality candidates so long as they are partnered with a higher-quality partner. For instance, WSU's official policy states that participation in the accommodation program by individual units is voluntary. Since many academic couples are hired into different departments and often different colleges (Ferber and Loeb, 1997), we believe it is likely that couples are often hired only if each candidate is independently deemed worthy of a job offer.

If couples wish to stay together and institutions typically evaluate members of couples independently of one another, lower-tiered institutions should benefit from the presence of couples of heterogeneous quality (expected productivity) in the market. Some individuals who would have received a more prestigious offer as a single candidate are passed over because those institutions did not find that person's partner suitable for an offer, pushing the couple to a less prestigious institution.³ Thus, the average productivity of partner hires should be higher than that of "single" hires in non-elite institutions. Furthermore, "secondary" hires—those who come to the institution as a result of an accommodation rather than receiving the initial job offer—should

³ Since colleges and universities in the U.S. are often geographically isolated and because of other frictions in academic labor markets, both members of a couple may not always be able to find a job at two different institutions that are close by at the same time. University accommodation policies can be useful in these circumstances. 93 percent of dual hires work at the same institution (Scheibinger, Henderson, and Gilmartin, 2008).

be no less productive than their traditionally hired peers, on average. These testable implications are the focus of this paper.

We empirically examine whether joint-hire faculty are in fact different in their productivity relative to their non-joint hire colleagues. Previous work by Scheibinger, Henderson, and Gilmartin (2008) used faculty survey responses to analyze the productivity of “second hires” (i.e. those whose partners were first recruited by the hiring institution). They find that after accounting for field, gender, and rank, productivity levels among second hires are not significantly different from those of other academics (based on self reports).

Rather than relying on survey data, we use a panel of administrative data representing the entire population of tenure-stream faculty at Washington State University’s (WSU) main campus (Pullman) for our analysis.⁴ This data contains information on whether individuals were hired using the university’s partner accommodation policy, allowing us to compare such faculty with other “traditional” hires over the same time frame. To our knowledge, an analysis of joint hires vs. non-joint hires with the universe of faculty at an institution has not previously been performed. Furthermore, in contrast to Scheibinger, Henderson, and Gilmartin (2008), we analyze both “primary” hires (meaning an individual was the first person in the couple to be offered a position) and “secondary” hires (meaning an individual was offered a position as part of the negotiation process for her partner’s job) in our productivity analysis.

We find that at WSU, the average individual hired as part of an accommodated couple publishes more articles per year relative to a comparable colleague hired in the traditional way. Additionally, we find that the higher average productivity of academic couples is driven by

⁴ Official records for those hired as couples were first kept in the 1990’s.

primary hires (who are plausibly often those individuals who would be difficult to recruit if they were not part of a couple), but that partner hires are generally not statistically distinct from individual hires, further supporting the claim that members of couples hired at WSU are largely evaluated based on their individual merits.

2 Data

Washington State University began keeping detailed records on couples who were hired using an established partner accommodation policy beginning in the 1990's. This policy allows the Provost's office to provide temporary funding—1/2 of an accommodated hire's salary for 2 years or 1/3 of the salary for 3 years—to help a receiving department hire the partner until a permanent position becomes available. The stated policy seems to imply that individual departments can treat the opportunity to hire a member of a couple without consideration of her partner:

*“Partner and spouse accommodation and assistance is a nonmandated program available throughout the multicampus University system to assist units in recruiting and retaining employees. **No unit is required to participate in this program.** Prospective employees are not to view partner and spouse accommodation and assistance as an entitlement.” (emphasis added)*

We use the administrative records to identify those faculty members (couples) who were hired under this policy as well as whether an individual was the “primary” (first) hire or the

“partner” (second) hire in the couple.⁵ The other variables used in our analysis come from separate administrative databases at WSU that are merged with the dual-hire list.

The productivity measures that are available to us come from a self-reporting system that was mandated in 2005 for the university’s largest college (College of Agricultural, Human, and Natural Resource Sciences, or CAHNRS) and in 2008 for all WSU faculty excluding the business school.⁶ Faculty members use this system to track various productive activities such as grants awarded, book publications, book chapters, journal articles, conference presentations, student evaluations, and the like. We believe the self-reported nature of these variables is not problematic because this database is used in annual reviews and in tenure and promotion decisions; it is cross-validated by department heads for accuracy. We use the number of peer-reviewed publications per year as the dependent variable in our analysis on productivity.⁷ We recognize that this measure does not perfectly capture productivity; however in a large research university such as WSU and in particular the Science, Technology, Engineering, and Math (STEM) disciplines, the number of publications is an important measure of the productivity of a tenure-stream faculty member. We examine differences in productivity for tenure-stream faculty who were hired through 2014. Table 1 describes the variables used in our analysis.

AnnPubs, the dependent variable in our analysis, is the sum of all peer-reviewed journal articles, book chapters, and books that were published in a given year. The variable *JointHire* represents an individual who was hired either as the primary or the partner hire in a couple via

⁵ There may have been couples who both independently sought positions and secured employment without the aid of this policy. Couples such as this would not be identified in our data.

⁶ Thus we use productivity data from 2005-14 for CAHNRS faculty and productivity data from 2008-14 for all other faculty. The results presented below are robust to simply using productivity data from 2008-14 on all faculty.

⁷ In this analysis, we do not have information about the quality of the publications, only the quantity in a particular year.

WSU's partner accommodation policy. *Primary* indicates a joint hire who was the first to receive a WSU job offer within the couple, and *Partner* indicates a joint hire who received accommodation through the university's policy. *Admin* is an indicator variable denoting whether or not an individual was serving in an administrative position that year. *Female* is an indicator for a female faculty member, and *Prior* captures the number of years of professional experience an individual had before coming to WSU. It is calculated by subtracting the individual's degree year from their WSU hire year. *Rank* is a series of indicator variables for those whose rank is Assistant, Associate, or Full Professor in a particular year (as well as a category for undetermined rank). We include indicator variables for each year in the study to control for secular influences in our data that may have changed over time as well as indicator variables for an individual's original hire year to account for differences in experience. *FTE* (full-time equivalence) is a series of indicator variables for what percentage of a full-time appointment a faculty's position is. We also include indicator variables for field of discipline (these are shown in Table 2). Including the field indicator variables in our regressions accounts for the potential that joint hiring occurs predominantly in either the most or least productive fields (as we have measured it).

Table 2 contains summary information about our data broken out by joint-hire status. The total number of unique individuals in our data is 1,172.⁸ 136 of these, or 12 percent, were hired as part of a joint hire couple, which is similar to the sample average in Scheibinger, et al. (2008) for those hired during the 2000's. 105 out of the 136 joint hires were primary hires and 31 were

⁸ These represent all tenure-stream faculty at WSU for whom we have at least 1 year of productivity data, which starts in 2005 for CAHNRS faculty and 2008 for all other faculty (excluding faculty in the business school, for whom we do not have productivity information).

partners.⁹ As seen in Table 2, a simple comparison of raw means of annual publications reveals that joint-hire individuals publish 0.38 more articles per year than those who were not joint hires. Joint hires are also more likely to be female and to have been hired more recently (this shows up in difference in original hire year as well as rank). This is expected given the secular increase in the presence of dual-career academic couples. Lastly, joint hires are disproportionately represented in the education and social science fields. These differences highlight the importance of controlling for these factors when examining observed productivity differences, at least in principle (since many of the variables in question are expected to be correlated with research productivity themselves). In the next section, we use multiple regression methods to do this.

3 Results and Discussion

We predict that individuals hired as part of a couple are, on average, more productive than their “single” (i.e. hired individually) colleagues within the same institution. We examine this implication with our WSU data by modeling the number of annual peer-reviewed publications as a function of joint-hire status (or, alternatively, including separate dummies for primary and partner hire) as well as all control variables described in Table 1:

$$pubs_{it} = f(JointHire_i, X_{it}, \varepsilon_{it}).$$

“ $pubs_{it}$ ” is the annual number of publications for individual i in year t (including co-authored pieces), $JointHire_i$ is an indicator that is equal to “1” if the individual was hired as part of a couple (and “zero” otherwise), X_{it} is a vector of the control variables listed above, and ε_{it} is the regression error. When primary and secondary hires are modeled separately, this becomes:

⁹ The reason for having more primary hires than partner hires is that our data includes only tenure-track faculty. There are many partner hires who were hired into non-tenure track (e.g. clinical, administrative) positions and do not show up in our data.

$$pubs_{it} = g(Primary_i, Partner_i, X_{it}, \varepsilon_{it}).$$

In our baseline specifications, we run ordinary least squares (OLS) on linear versions of the equations above. Alternatively, we explicitly account for the panel nature of our data by performing Random Effects (RE) estimation. Because we have panel data (multiple annual observations on faculty members), we estimate standard errors that are not only robust to heteroskedasticity but clustered at the individual level to account for possible serial correlation (within a faculty member over time).

In Table 3, we present our results examining how joint hires and non-joint hires compare in terms of publications per year at WSU. Our key finding is that even after controlling for other factors related to each individual's history and field, joint hires have more publications per year, on average, than their non-joint hire colleagues. The OLS results (Column 1) indicate that joint hires publish 0.32 more refereed pieces per year, a difference of nearly 20 percent at the non-joint hire mean. This effect is statistically significant at the 5 percent level. The RE results (Column 3) indicate a very similar coefficient.¹⁰

Columns 2 and 4 of Table 3 show results from models in which effects for primary and partner hires are allowed to differ. These indicate that primary hires are substantially more productive than regular (single) hires and that partner (secondary) hires are not very different from single hires. The magnitude of the "partner" effects are very small and not statistically significant at conventional levels. Though partner hires need not be the less attractive candidate in the couple at the time of hire, our results suggest that this may often be the case. Nevertheless, these individuals do just as well as their single colleagues in terms of research publications,

¹⁰ Some publication observations in our productivity data appear to be duplicates (i.e. an article/book/book chapter with the same title published in different years). To guard against double counting, we only count a publication with a unique title the last time it appears in a faculty member's self reports.

which implies that they are largely being evaluated for hire without regard to their partners' potential (i.e., with an independent hiring rule).

We also examine how our results compare across gender. Table 4 shows the same specifications contained in Table 3 but for males and females separately. It is apparent that male partners drive the result that primary couple hires have exceptionally high productivity. However, it is also the case that male secondary hires are, on average, substantially less productive than their single colleagues. Female joint hires, on the other hand, do about as well as their non-joint hire peers regardless of whether they are the primary or secondary hire in the couple. Though differences are not statistically significant, if anything it is female *partner* hires who are more productive than female *primary* hires. However, we caution that once the models are run separately by gender, the sample size of partner hires becomes quite small (especially for males). The difference in results by gender does raise the possibility that the institution views the opportunity to hire female primary partners differently than that of hiring male primary hires. However, our current model is silent on this issue, so we leave the exploration of this idea to future research.

4 Summary and Conclusions

The presence of couples who are both in the academic labor market could affect the quality distribution of employees within a single institution. Due to the geographic distance between many universities, couples must often seek employment within the same institution if they wish to remain together. When couples are comprised of candidates with different employment options, one of the two may choose to accept an offer from a less prestigious institution in order to be near her partner. If members of couples are evaluated independently, which is consistent with Washington State University's partner accommodation policy, all but

the most elite universities can attract talent above their average by offering jobs to both partners of a couple. As a result, the expected level of productivity for the average joint hire individual in these institutions might be higher than that of their colleagues.

We test whether couple hires are different in terms of research productivity (number of peer-reviewed publications in a given year) using data on tenure stream-faculty at Washington State University. Overall, joint hires publish more than their non-joint hire colleagues. This is driven by the exceptional productivity of primary couple hires, but secondary or partner couple hires do no worse, on average, than their single-hire peers as well.

Our work provides insight for university administrators who may be considering policies to aid in the recruitment of couples. We note that when an institution's more prestigious peers fail to hire couples (either because one of the two partners does not measure up or because their policy for couple hiring is insufficient), that institution stands to benefit by hiring faculty who might otherwise be unavailable. As the presence of dual-academic couples continues to expand, the benefit of policies that facilitate the hiring of couples is likely to increase, particularly for institutions that are geographically isolated.

References

- Compton, Janice, and Robert A. Pollak. "Why Are Power Couples Increasingly Concentrated in Large Metropolitan Areas?" *Journal of Labor Economics* 25.3 (2007): 475-512.
- Costa, Dora L., and Matthew E. Kahn. "Power Couples: Changes in the Locational Choice of the College Educated, 1940-1990." *The Quarterly Journal of Economics* 115.4 (2000): 1287-1315.
- Ferber, Marianne A., and Jane W. Loeb. 1997. *Academic Couples: Problems and Promises*. University of Illinois Press.
- Guler, Bulent, Fatih Guvenen, and Giovanni L. Violante. "Joint-search theory: New opportunities and new frictions." *Journal of Monetary Economics* 59.4 (2012): 352-369.
- Kojima, Fuhito, Parag A. Pathak, and Alvin E. Roth. "Matching with Couples: Stability and Incentives in Large Markets." *The Quarterly Journal of Economics* 128.4 (2013): 1585-1632.
- Li, Jinxiong. 2009. "Academic Couples and the Economics of the Co-location Problem." Retrieved from the University of Minnesota Digital Conservancy, <http://purl.umn.edu/52334>.
- McFall, Brooke H., and Marta Murray-Close. 2015. "Moving out to Move up: Dual-Career Migration and Work-Family Tradeoffs." *Economic Inquiry*. doi: 10.1111/ecin.12283.
- Scheibinger, Londa, Andrea Davies Henderson, and Shannon K. Gilmartin. 2008. "Dual-Career Academic Couples: What Universities Need to Know." The Clayman Institute for Gender Research: Stanford University. <http://gender.stanford.edu/dual-career-research-report>.
- Wolf-Wendel, Lisa, Susan B. Twombly, and Suzanne Rice. 2004. *The Two-Body Problem: Dual-Career-Couple Hiring Practices in Higher Education*. JHU Press.

Tables

Table 1 – Variable Names and Definitions

Variable	Description
<i>AnnPubs</i>	Number of peer reviewed journal articles, book chapters, or books published
<i>JointHire</i>	= 1 if the individual was part of a jointly hired couple, 0 otherwise
<i>Primary</i>	= 1 if the individual was first to receive the employment offer
<i>Partner</i>	= 1 if the individual was not the primary hire
<i>Admin</i>	= 1 if the individual is an administrator, 0 otherwise
<i>Female</i>	= 1 if the individual is female, 0 otherwise
<i>Prior</i>	Number of years between highest degree and starting year at WSU
<i>Rank</i>	Indicators for Assistant, Associate, Full Professor and Undetermined
<i>Year</i>	Year of observation indicator variables
<i>OHY</i>	Original Hire Year indicator variables
<i>FTE</i>	Indicators for level of full-time status at the university
<i>Field</i>	Indicators variables for field of specialization

Table 2 – Summary Statistics

	Non-Joint Hire Mean	Joint Hire Mean	Diff	P-value for diff
Annual Publications	1.68	2.06	-0.38	0.00
Female	0.28	0.43	-0.15	0.00
Prior Experience (years)	5.20	5.97	-0.77	0.00
Original year of Hire	1995	2004	-9	0.00
Rank				
Undetermined	0.06	0.03	0.03	0.00
Assistant Professor	0.19	0.39	-0.2	0.00
Associate Professor	0.29	0.36	-0.07	0.00
Full Professor	0.46	0.23	0.23	0.00
FTE				
Less Half-time	0.01	0.00	0.01	0.07
Half-time	0.03	0.01	0.02	0.00
3-Quarter-time	0.04	0.06	-0.02	0.00
Full-time	0.93	0.93	0	0.93
Field				
Ag, Enviro & Resources	0.11	0.05	0.06	0.00
Arts	0.03	0.02	0.01	0.02
Business	0.06	0.05	0.01	0.82
Communication	0.02	0.02	0	0.39
Education	0.04	0.09	-0.05	0.00
Engineering	0.16	0.13	0.03	0.04
Health Sci & Medicine	0.11	0.08	0.03	0.02
Humanities	0.06	0.09	-0.03	0.00
Life Sciences	0.13	0.15	-0.02	0.13
Mathematical Sciences	0.04	0.02	0.02	0.01
No Field	0.05	0.03	0.02	0.01
Other	0.01	0.01	0	0.64
Physical Sciences	0.07	0.05	0.02	0.01
Social Sciences	0.12	0.22	-0.1	0.00

Notes: There are 6,567 person-year observations representing 1,172 unique individuals over the years 2005-2014. The data contain observations on 136 joint hires; 105 of these are primary hires and 31 are partner hires.

Table 3 – Marginal Effects for Publications per Year, OLS and Random Effects Models

	OLS		Random Effects	
	Model 1	Model 2	Model 1	Model 2
Joint Hire	0.324** (.159)		0.315** (.151)	
Primary		0.408** (.176)		0.412** (.171)
Partner		-0.0490 (.273)		-0.0628 (.238)
Female	-0.194 (.139)	-0.186 (.139)	-0.222* (.118)	-0.213* (.118)
Observations	6,567	6,567	6,567	6,567
R-sq/Pseudo R-sq	0.187	0.188	0.183	0.184

Notes: Standard errors are in parenthesis and are clustered by individual. Controls for prior experience, FTE, year of hire, year of observation, academic rank, and field of expertise are not reported.

*** p<0.01, ** p<0.05, * p<0.1

Table 4 – Marginal Effects for Publications per Year, by Gender

	OLS				Random Effects			
	Males		Females		Males		Females	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Joint Hire	0.440** (.206)		0.119 (.268)		0.389* (.202)		0.174 (.238)	
Primary		0.674** (.204)		0.0181 (.31)		0.633** (.208)		0.0995 (.283)
Partner		-0.984** (.401)		0.408 (.296)		-0.893** (.351)		0.355 (.279)
N	4610	4610	1957	1957	4610	4610	1957	1957
R-sq/Pseudo R-sq	0.206	0.210	0.219	0.220	0.203	0.207	0.209	0.209

Notes: Standard errors are in parenthesis and are clustered by individual. Controls for prior experience, FTE, year of hire, year of observation, academic rank, and field of expertise are not reported.

*** p<0.01, ** p<0.05, * p<0.1

Two-body problem: As one body orbits the other, it tugs gravitationally on its partner, altering the original orbit. Then the second body does the same. An examination of the dual-career policies and practices within academe is important in large part because the experiences of the six people mentioned above are hardly unique. They are part of a fast growing number of academic couples in which both seek tenure-track faculty positions. These studies of faculty productivity center on publications, since publication is regarded as the primary indicator of faculty success (Jarvis 1992). It seems intuitive that dual-career assistance would enhance productivity in other areas of job responsibility as well (teaching, for example), but there is no empirical research that supports this contention. The two-body problem is a dilemma for spouses (or any other couple) working in typically academia (or sometimes other fields) that describes the difficulty of both spouses obtaining jobs at the same university or within a reasonable commuting distance from each other. Learn more; Top users. Applying same graduation school with my girlfriend, is it ethical? Me and my girlfriend are currently studying in the same university and same department. We both applied couple of master's degree programs abroad. One of the programs is in both our interest and she