Gender and Job Chains in Local Economic Development

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Article

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Abstract

Over the past decade, the welfare evaluation of local economic development activities has become increasingly sophisticated. Projected or realized gains have been broken down by wage levels, household income levels, and race. However, relatively little attention has been paid to the distribution of gains by gender. In parallel, the gender literature has recognized the distribution of economic development activity by income group but not by vacancies. The authors present an evaluation approach—the *job chains model*—that combines the two. Occupations with a high proportion of women are identified and isolated at each wage level. The authors estimate the proportion of job chain vacancies induced by new "female" jobs and their welfare impacts. Findings suggest that women are underrepresented in welfare gains associated with both male and female high-wage jobs. The applicability of the authors' approach for evaluating alternative industrial targets is demonstrated.

Keywords

employment creation, gender, job chains

Introduction

Over the past two decades, researchers addressing the welfare evaluation of local (i.e., subnational) growth and economic development activities have increasingly focused on the distribution of such gains. Projected or realized gains have been disaggregated by wage levels (Persky, Felsenstein, & Carlson, 2004), household income levels (Bartik, 1994, 2004), and race (Bartik, 1993). However, relatively little attention has been paid to the distribution of quantitative gains by gender. This seems somewhat surprising because many jobs in the economy still have strong gender identities. Our own approach to evaluating economic development activities, the job chains approach, is particularly well suited to an analysis by gender because, like jobs themselves, job chains demonstrate persistent gender characteristics.

Although job growth of any kind is likely to raise an area's economic welfare, we are particularly concerned with growth that encourages upward mobility of those at the lower end of the wage ladder. Earlier research has suggested that mid-wage jobs do the most in this regard (Persky et al., 2004). But does such local growth affect the mobility of women and men differently? The issue arises because it has often been argued that a major cause of gender wage gaps is the more limited mobility in women's careers. Many well-documented labor market inequalities limit job access and earning opportunities for women. For example, on-the-job human capital accumulation for women is limited because of intermittent labor market participation (Manning & Swaffield, 2008). Job shopping is constrained because differences in returns to mobility are relatively low for women (Keith & McWilliams, 1997; Loprest, 1992). Even psychological factors such as attitudes to risk taking and competitive behavior are invoked (Babcock & Laschever, 2003). Surprisingly, empirical tests of these constraints do not explain more than 60% of the gender wage gap (Manning & Swaffield, 2008). The intuitive conclusion that market discrimination is responsible for the rest is not always supported. Black, Haviland, Sanders, and Taylor (2007), while finding clear evidence of the gender wage gap, claim that early career differences in human capital investment and gender norms that determine occupational choice are more potent factors than labor market discrimination. Finally, Hirsch, König, and Möller (2009) find substantial difference in gender wage gaps across different local labor markets with smaller gender wage gaps in metropolitan areas than in rural labor markets.

Although women's working lives may have changed and earnings differentials converged, marriage, motherhood, and child care still affect the choices that women make in the

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labor market (Warner, 2006). This in turn affects their employment conditions and job mobility (Eberharte, 2003). The rise in female labor force participation rates has been well documented in both Europe and the United States (Altonji & Blank, 1999; Rubery, Smith, & Fagan, 1999). Secular shifts underpin this increase in participation, such as the move from manufacturing to services and from full-time to part-time work. The evidence shows a distinct gender bias in this part-time employment, much of which is characterized by high levels of labor turnover and low levels of job tenure. The situation relating to mobility in and out of the labor market is even more gender pronounced. The probability of women entering and exiting the labor market over a given time period is two to four times higher than that for men (Hakim, 1996).

Our concern here is primarily with labor mobility within and between jobs. We are interested in the gender outcomes of aggregate job creation and focus specifically on the following questions:

- Does economic development that creates "male"-type jobs generate vacancies in "female" occupations and vice versa?
- Does the growth of mid-wage "female jobs" produce less upward mobility than does the growth of mid-wage "male jobs"?
- Does a new male job at a given wage level generate more or less economic welfare than a new female job at the same wage level?

To anticipate our basic finding, our estimates do not suggest substantial differences between male and female jobs in their generation of upward mobility or overall economic welfare. From the perspective of local economic development, neither of these sets of job chains seems to enjoy a significant advantage. Of course, new female jobs are considerably more likely to benefit women and vice versa for male jobs. Such considerations might reasonably affect policy goals in light of past discrimination and ongoing gender wage gaps. More attention to female jobs in local economic development strategies may well be warranted.

The article proceeds as follows: We briefly sketch the outlines of the job vacancy chains model in the next section. This is followed by a description of the way we identify gendered job chains and an example of the basic mechanics of estimating mobility along job chains for "male" and "female" jobs. The following section extends the analysis to gendered jobs disaggregated by income groups. This allows us to discuss our results in terms of the welfare gains and distributional impacts associated with job mobility. We then translate the approach to industrial categories and present results for two hypothetical economic development projects: a subsidy of 100 new jobs in a "male"-type sector (autos) compared with a similar subsidy in a "female"-type sector (hospital employment). Finally, we conclude with some policy implications arising from our findings.

Describing the Job Chains Model

New jobs generate a chain-like sequence in the local labor market. The job chains model estimates all the subsequent vacancies generated by a new job. As the new job taker vacates an existing position, a chain of vacancies is set in motion that is only truncated when a vacancy is occupied by a worker who does not leave any replacement in the labor market, such as a first-time entrant, an unemployed worker, or a migrant. This particular conception of labor market dynamics is grounded in two stylized beliefs. The first relates to the existence of some slack in the labor market. The existence of persistent underemployment or involuntary unemployment allows for the freedom to move up chains. The second belief relates to the existence of *sticky wages*. As wages are slow to adjust to changes in labor supply (Devereux, 2003), this makes for a relatively stable wage structure in which chain movement is animated by the creation of vacancies and not by instantaneous wage incentives.

The mechanics of the job chains models have been outlined elsewhere (Felsenstein & Persky, 2007; Persky et al., 2004).[1] We can stratify labor market information on job changers by leading job attributes such as economic sectors, locations, income levels, and so on. Armed with information on job changers' origins and destinations within any of these variables, we are able to set up a matrix whose cells give us the probability of moving between the strata of the job attributes, for example, between economic sectors, locations, or income classes. Taking the Leontief inverse of this matrix allows us to measure the amount of movement in each chain; that is, the number of links or vacancies created before the chain is truncated. This approach yields a *vertical vacancy multiplier* that works in addition to any traditional multiplier effects. Where the traditional multiplier generates *horizontal vacancies* as one direct job indirectly stimulates new intermediate and induced jobs, the vertical vacancy multiplier opens new *subterranean* or *vertical chains* as workers filling new jobs leave behind them vacancies in their previous workplaces.

Finally, with information on the previous and present wage levels of job changers we are in a position to estimate the welfare effects of new jobs and the vacancies they create. We can observe the efficiency effects of job creation by estimating this welfare gain as a share of the initial wage and by seeing in which industries or income classes this gain accumulates. This latter observation adds a distributional twist to the analysis. We are able to observe whether jobs that opened up in one sector or wage class eventually trickle down via the vacancy mechanism to other sectors or income groups.

Gendering Jobs

Our empirical data come from the Panel Study of Income Dynamics (PSID) conducted annually since 1968 by the Institute for Social Research at the University of Michigan. We use a sample of job changers relating to the time period 1987 to 1992 that covers about 3,600 job moves by household heads and spouses. These represent about 600 individuals a year who take new positions. Half of these start with a new employer and account for roughly 91% of all employed workers in the sample.[2] It should be noted that the PSID does not provide continuous job histories for heads and spouses. Rather, it reports detailed data on the length of tenure of the current position but no information on any other jobs since the last interview. As such, the data may be underestimating frequency of job changes. On the other hand, the PSID data are particularly useful for identifying both interfirm mobility (i.e., a change of employer) and intrafirm mobility (i.e., a change of position).

We start with an admittedly crude effort at classifying jobs by gender. The reality of the economy is that some jobs retain gender identification. We simply use the share of women in an occupation's employment to characterize a job as female. More specifically, if the share of women hires in all hires in our PSID sample is greater than two thirds, we define the occupation as female. Table 1 gives a full list of these occupations at the three-digit level. These jobs account for 41% of all workers and 68% of women workers in the PSID sample.

From Table 2 we can see the actual distribution of job takers for those jobs classified as male or female. Jobs characterized as male or female perpetuate this gender identity in practice. Male and female jobs are also occupied by the opposite sexes and the unemployed in roughly equal shares. They differ, however, in respect to other forms of labor market entrants. Female jobs are much more identified with job takers coming from out of the labor force while male jobs have a higher representation of in-migrants.

Taking the Leontief inverse of our simple origin–destination (male–female) matrix, we can observe the number of vacancies set in motion by a new male job or a new female job. Our results show that at this aggregate level, chains are somewhat longer if started with a male job (Table 3). The job chains multiplier associated with a new male job (3.15), which represents the number of resulting vacancies, is somewhat longer than that for a female job (2.61). Given past and present wages of the job changers, we can also estimate the welfare gain from moving through a chain as a share of the initial wage (V/W). This is also larger for chains starting with a male job (0.62 v. 0.49). Wage gains through chains are also substantially larger for chains starting with a male job (0.26 v. 0.07). Our data therefore suggest that chain gains for female jobs are small because, on average, people moving from a female job to a female job do not gain in wages.

To identify distributional effects in addition to welfare effects we expand our gendered jobs into gendered wage classes. We stratify the PSID data into real-wage classes based on hourly wage rates, ranging from $25.50-$40.00 (Group 1) down to $4.25-$6.70 (Group 5). In our PSID sample, job takers filled vacancies in these five categories as suggested by the first row of Table 4. The gendering of jobs suggests a simple disaggregation of our categories into male and female jobs at each wage level. This disaggregation is carried out in Table 4 for job takers. It is clear that female job vacancies are much more likely than male job vacancies to be in the moderate (Group 3) and low-wage (Groups 4 and 5) sectors. In the lowest wage group, female job vacancies outnumber male job vacancies by almost two to one. Vacancies in the highest wage sector (Group 1) are more than eight times more likely to be in male jobs than in female jobs. Indeed, there are relatively few Group 1 job titles that qualify as female. It is difficult to reach the wage level of Group 1 in a female job.

Where did the job takers for each group come from? For all the categories of job vacancies (e.g., Wage Group 1 male jobs, or Wage Group 2 female jobs), Table 5 presents the origins of those filling the vacancies. Wage Group 3 accounts for the highest level of upward mobility for low-wage workers (defined as those originating in Groups 4 and 5). If we look at Wage Group 3 female jobs, we find that 44.9% of these vacancies were filled by workers coming from jobs in the same gender wage group,[3] whereas 7.5% were coming from male jobs in that wage group. About 18% of these openings allowed workers in female jobs in Wage Group 4 to move up, whereas about 1% of these vacancies went to those in male jobs in Group 4. The unemployed filled about 8% of these vacancies, whereas those most recently out of the labor force filled 11% and in-migrants to the state took 7.6%. Exchanging gender titles, we find a similar mobility pattern for Group 3 male jobs, with the only sizable differences being that these vacancies attracted more workers from the unemployed (13%) and in-migrants (11%) and fewer from out of the labor force (5.7%). Thus, although female job chains starting in Group 3 are more frequently terminated by drawing on workers out of the labor force, male jobs are more likely to be terminated by drawing on in-migrants and unemployed. On net, though, the termination rate and hence chain length (as discussed in greater detail below) are quite similar.

For Wage Groups 1 and 2, female jobs are a good deal more likely to be filled by a job mover from an equivalent male job than vice versa. Thus, 20.5% of female job vacancies in Group 1 are filled by movers from male jobs in Group 1, only a little less than the 22.6% of these vacancies going to job changers from female Group 1 jobs.

Finally, we note that for Wage Groups 4 and 5, female jobs are a good deal more likely to be filled by nonjob holders (unemployed, out of labor force, in-migrants) than are male

Table 1. Three-Digit Occupational Codes in the 1987-1992 PSID With a Preponderance (>67%) of Female Hires

32 Librarians
56 Personnel and labor relations workers
74 Dietitians
75 Registered nurses
76 Therapists
80 Clinical laboratory technologists and technicians
81 Dental hygienists
82 Health record technologists and technicians
83 Radiologic technologists and technicians
84 Therapy assistants
85 Health technologists and technicians, n.e.c.
93 Psychologists
100 Social workers
101 Recreation workers
113 Health specialties teachers
114 Psychology teachers
123 Art, drama, and music teachers
125 Education teachers
126 English teachers
130 Foreign language teachers
131 Home economics teachers
141 Adult education teachers
142 Elementary school teachers
143 Prekindergarten and kindergarten teachers
144 Secondary school teachers
145 Teachers, except college and university, n.e.c.
174 Vocational and educational counselors
183 Designers
212 Health administrators
220 Office managers, n.e.c.
222 Officials and administrators; public administration, n.e.c.
224 Postmasters and mail superintendents
225 Purchasing agents and buyers, n.e.c.
230 Restaurant, cafeteria, and bar managers
262 Demonstrators
270 Real estate agents and brokers
280 Salesmen and sales clerks, n.e.c.
301 Bank tellers
303 Billing clerks
305 Bookkeepers
310 Cashiers
311 Clerical assistants, social welfare
312 Clerical supervisors, n.e.c.
314 Counter clerks, except food
321 Estimators and investigators, n.e.c.
325 File clerks
326 Insurance adjusters, examiners, and investigators
330 Library attendants, and assistants
341 Bookkeeping and billing machine operators
343 Computer and peripheral equipment operators
344 Duplicating machine operators
345 Key punch operators
350 Tabulating machine operators
355 Office machine operators, n.e.c.
360 Payroll and timekeeping clerks
361 Postal clerks
362 Proofreaders
364 Receptionists
370 Secretaries, legal
372 Secretaries, n.e.c.
375 Statistical clerks
376 Stenographers
381 Stock clerks and storekeepers
382 Teacher aides, exc. school monitors
383 Telegraph messengers
385 Telephone operators
390 Ticket, station, and express agents
391 Typists
394 Miscellaneous clerical workers
395 Not specified clerical workers
425 Decorators and window dressers
443 Furniture and wood finishers
610 Checkers, examiners, and inspectors; manufacturing
613 Dressmakers and seamstresses, except factory
630 Laundry and dry cleaning operatives, n.e.c.
663 Sewers and stitchers
671 Knitters, loopers, and toppers
672 Spinners twisters, and winders
673 Weavers
703 Bus drivers
901 Chambermaids and maids, except private household
902 Cleaners and charwomen
910 Bartenders
912 Cooks, except private household
914 Food counter and fountain workers
915 Waiters
916 Food service workers, n.e.c., except private household
921 Dental assistants
922 Health aides, exc. nursing
925 Nursing aides, orderlies, and attendants
926 Practical nurses
931 Airline stewardesses
933 Attendants, personal service, n.e.c.
940 Boarding and lodging housekeepers
942 Child care workers, exc. private household
944 Hairdressers and cosmetologists
960 Crossing guards and bridge tenders
980 Child care workers, private household
981 Cooks, private household
982 Housekeepers, private household
983 Laundresses, private household
984 Maids and servants, private household

Table 2. The Origins of Male and Female Job Takers

Origin	Male	Female
Male	58.8%	10.7%
Female	11.4%	48.7%
Unemployed	12.9%	12.9%
Out of labor force	6.5%	22.3%
In-migrant	10.4%	5.4%
Total	100.0%	100.0%

Table 3. Basic Welfare Effects Stratified by Gender

Multipliers (Vacancies)	Male	Female
Male jobs	2.58	0.54
Female jobs	0.57	2.07
Total job multiplier	3.15	2.61
V/W	0.62	0.49
V/W through chains	0.16	0.04
Share through chains	0.26	0.07
Share not from chains	0.74	0.93

Table 4. Job Vacancies for Male and Female Jobs

	Wage Groups					
Vacancies	Group 1	Group 2	Group 3	Group 4	Group 5	All Groups
Share of all vacancies	7.10%	16.05%	27.04%	29.45%	20.36%	100.00%
Male job share of all vacancies	6.35%	12.08%	15.31%	14.05%	7.02%	54.82%
Female job share of all vacancies	0.74%	3.97%	11.73%	15.40%	13.34%	45.18%

Table 5. Mobility into Male and Female Jobs

	Destination									
Origin	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
Male 1	39.3%	20.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Female 1	2.3%	22.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Male 2	25.1%	0.2%	49.2%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Female 2	2.3%	23.9%	4.4%	37.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Male 3	2.0%	0.0%	17.1%	5.2%	41.1%	7.5%	0.0%	0.0%	0.0%	0.0%
Female 3	2.7%	5.4%	3.7%	26.4%	5.5%	44.9%	0.0%	0.0%	0.0%	0.0%
Male 4	1.7%	0.0%	1.9%	0.1%	16.4%	0.9%	42.0%	7.6%	0.0%	0.0%
Female 4	0.8%	0.0%	0.0%	0.1%	4.0%	18.4%	9.0%	40.0%	0.0%	0.0%
Male 5	0.0%	0.0%	0.4%	0.0%	2.1%	0.4%	9.6%	2.2%	34.3%	4.4%
Female 5	0.0%	0.0%	0.0%	0.2%	0.7%	1.4%	6.0%	10.1%	10.7%	27.6%
Unemployed	3.3%	0.0%	4.8%	1.8%	13.0%	7.7%	20.2%	13.4%	32.2%	22.9%
Out of labor force	4.0%	16.3%	3.9%	6.7%	5.7%	11.1%	6.0%	21.3%	17.3%	39.8%
In-migrant	16.7%	11.2%	14.7%	7.4%	11.4%	7.6%	7.2%	5.4%	5.4%	5.4%
Column sum	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note. Highlighted cells on the diagonal show within-group wage mobility and mobility between male and female occupations within the same wage class. Other highlighted cells show the origins of within-wage group mobility in response to the creation of a new male or female job.

Table 6. Gender–Wage Group Multipliers

	New Job Creation									
Multipliers	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
Male 1	1.66	0.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Female 1	0.05	1.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Male 2	0.86	0.37	2.01	0.46	0.0	0.0	0.0	0.0	0.0	0.0
Female 2	0.14	0.54	0.14	1.64	0.0	0.0	0.0	0.0	0.0	0.0
Male 3	0.35	0.23	0.63	0.39	1.72	0.24	0.0	0.0	0.0	0.0
Female 3	0.25	0.46	0.26	0.85	0.17	1.84	0.0	0.0	0.0	0.0
Male 4	0.20	0.12	0.27	0.18	0.52	0.18	1.76	0.22	0.0	0.0
Female 4	0.15	0.18	0.16	0.32	0.25	0.61	0.26	1.70	0.0	0.0
Male 5	0.05	0.04	0.08	0.06	0.15	0.07	0.28	0.11	1.54	0.09
Female 5	0.05	0.05	0.07	0.09	0.12	0.15	0.22	0.27	0.23	1.39
Total job multiplier	3.77	3.74	3.63	4.00	2.93	3.08	2.53	2.30	1.77	1.49
Male	3.12	1.20	2.99	1.09	2.39	0.49	2.04	0.33	1.54	0.09
Female	0.64	2.54	0.64	2.90	0.54	2.60	0.49	1.97	0.23	1.39

Note. Entries in the matrix show the expected number of vacancies in each row group generated by a new job created in the column group. The multipliers on the diagonal (all greater than 1) include the newly created job.

jobs. Thus, for female jobs in Group 5, 68% of vacancies are filled by nonjob holders, whereas the corresponding figure for male jobs is 55%.

Mobility in Gendered Job Chains

Just as in the simpler case of Table 2, a more complex origin–destination matrix, Q, like the square portion of Table 5, can be used to estimate vacancy multipliers generated by new jobs in each of the 10 gender–wage group categories. Again, these multipliers are given by the simple Leontief inverse $(I\text{-}Q)^{-1}$ (Persky et al., 2004). Table 6 presents the multipliers corresponding to the matrix in Table 5.

Looking first at the row labeled "Total Job Multipliers," we interpret each entry as the number of vacancies at all levels generated by a new job in the column gender–wage

group. Thus, a new Group 2 male job generates 3.63 vacancies, the initial job, and 2.63 other vacancies as part of the average chain begun with the new job. A new female job in Wage Group 2 actually generates more vacancies, with an overall multiplier of 4.0. The claim that these chains are gendered is supported by the distribution of vacancies created between male and female jobs. More than 80% of the vacancies created by a new male job are in male occupations. For new women's jobs the corresponding figure ranges from about 65% at the highest wage levels to more than 90% at the lowest.

Of course there are crossovers. For Wage Groups 1 and 2, on average, a new female job generates more than one male job vacancy and a new male job generates about 0.64 female job vacancies. In contrast, in Wage Groups 4 and 5, female jobs initiating chains generate very few male job vacancies.

These vacancy multipliers give us insights into the origins and character of the mobility generated by new jobs. The most important (i.e., largest) transitions are upward moves between adjacent wage groups of the same gender. The most important of these transitions are from Group 2 to 1, 3 to 2, and 4 to 3. Group 5 job holders do not participate strongly in job expansions at the Group 4 level.[4] Interestingly, Group 2 female jobs generate more Group 3 female job vacancies than do Group 2 male jobs.

These chain differences in themselves are difficult to evaluate. They take on more meaning when they are translated into welfare gains to chain participants. We estimate such gains based on Equation (1)[5]:

$$\begin{aligned} V_j = {} & \text{gains to locally employed workers moving up chains originating at level } j \\ & + \text{gains to unemployed, out of labor force and in-migrants} \\ = {} & \textstyle\sum_i m_{ij}[(\sum_k q_{ki} * (w_i - w_k)] \\ & + \textstyle\sum_i m_{ij} \sum_h t_{hi} * (w_i - c_{hi})], \end{aligned} \tag{1}$$

where m_{ij} is the Leontief multiplier derived from a job chain matrix like that in Table 6, w_i is the wage for a job at level i, q_{ki} is the entry on the kth row and ith column of the job chain matrix, t refers to the wage gain to terminal groups, and c stands for opportunity cost.

The third row of Table 7 presents the V_js as shares of the average wage in group j. These ratios can be considered as crude measures of efficiency gain relative to wage bills for each job group. In general, new low-wage jobs generate greater benefits because they draw more heavily on the unemployed and out of the labor force. This conclusion is true for female jobs as well as male jobs. The first and second rows of Table 7 present the first and second portions of Equation (1) for each group j; that is, the first row gives the gain from upward mobility and the second row gives the gain to terminal groups (the unemployed, out of the labor force, and in-migrants). The two rows added together give the third row. This disaggregation suggests that male and female jobs show quite similar patterns. Terminal gains rise steadily as we move down from the highest paying to the lowest paying jobs.[6] Chain gains fall steadily. Within each wage group the female jobs show about the same mobility gains through chains as do the male jobs. Within wage groups, neither new male nor new female jobs could be characterized as offering more gains through upward mobility. A new Group 2 male job generates upward mobility gains equal to about 17% of the average Group 2 wage, whereas a corresponding Group 2 female job generates mobility gains of about 18% of the average Group 2 wage. The corresponding figures for Group 3 are 14% and 12%.

A bit more disaggregation of the terminal gains suggests a possibly significant welfare difference between male and female job chains. In the former, a higher share of total gains (and higher share of terminal gains) is associated with in-migration. These shares are shown in Table 8. Thus, in Wage Group 2, 44% of terminal gains for male jobs go to in-migrants, but only 34% of such gains for female jobs go to in-migrants. The difference here is that female jobs, as noted above, are more likely to be filled by those out of the labor force. From a local economic development perspective, the result suggests that new female jobs, as contrasted with new male jobs, draw more heavily on those already living in the local area and less heavily on in-migrants.

Gains to Men and Women

With the exception of the in-migration differences, the estimates from the last section suggest that new male and female jobs in the same wage group generate similar job mobility effects and overall welfare effects. That said, the welfare gains associated with female chains are much more likely to accrue to women, whereas those associated with male chains are much more likely to accrue to men.

The PSID database has the actual gender of job takers for the years in our sample. As a result we can estimate the share of welfare gains expected to go to women and men for each type of job chain. The estimate is based on the assumption that, whatever the chain, the gender distribution for a given move is proportional to the overall gender distribution for that move. That is, in a chain starting with a new Group 1 male job, the share of women in the move from Group 3 male job to Group 2 female job is the same as the gender distribution for the same move in a chain starting with a new Group 1 female job.[7]

The estimated gains going to women are given in Table 9. Entries here show estimates of women's shares of welfare gains (both from chains, terminal placements, and total) for each wage–gender job type. Thus, looking at Group 3 jobs, we estimate that women receive 33% of all the welfare gains

Table 7. Total Welfare Gains and Those From Mobility and Terminal Placements as Shares of New Group Wages for Gender–Wage Groups

	Wage Groups by Gender									
Welfare Gains	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
Mobility gains/W	0.24	0.20	0.17	0.18	0.14	0.12	0.07	0.06	0.00	0.00
Terminal gains/W	0.20	0.21	0.26	0.27	0.43	0.43	0.55	0.56	0.65	0.69
Total V/W	0.44	0.41	0.43	0.44	0.57	0.56	0.63	0.62	0.65	0.69

Table 8. Welfare Gains From In-Migration Placements as Share of New Group Wages, Welfare Gains, and Terminal Gains for Gender–Wage Groups

	Wage Groups by Gender									
Welfare Gains in In-Migrants	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
In-migration as share of W	0.11	0.09	0.11	0.09	0.13	0.10	0.10	0.07	0.06	0.05
In-migration as share of V	0.25	0.21	0.27	0.21	0.22	0.19	0.15	0.12	0.10	0.08
In-migration as share of terminal	0.54	0.42	0.44	0.34	0.30	0.24	0.18	0.13	0.10	0.08

Table 9. Women's Share of Chain Welfare Gains by Gender–Wage Groups

	Wage Groups by Gender									
	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
Women Share Total	15.62%	55.96%	17.01%	56.78%	32.84%	81.35%	35.25%	87.62%	42.67%	92.40%

generated by a chain starting with a new male job in this category. In contrast, women receive 81% of the gains generated by a chain starting with a Group 3 female job. The pattern is similar for Groups 4 and 5. However, a much lower share of gains generated by Group 2 female jobs, as well as by Group 1 female jobs, accrues to women: 56% and 57%, respectively. Men participate actively in these chains, and are surprisingly likely to gain as terminal placements. In this sense, these female job chains are much less gendered than those in lower wage groups. The same is not true for high-wage male job chains. Women gain relatively little from these chains: 16% of gains from Group 1 male jobs and 17% from Group 2 male jobs, despite the fact that women participate actively in chains generated by male jobs in Groups 3, 4, and 5. We estimate that 33% to 43% of gains in these chains go to women (Table 9).

Women's Welfare and Industrial Targeting

In the past, industrial targeting at the state and local levels has been conducted with an eye toward gross job creation and fiscal impacts. We have previously argued the need for evaluation of economic development plans with respect to the impact on low- and moderate-wage workers. Gender barriers to employment at these wage levels are particularly pronounced (Blumenberg, 2002). In particular, we have noted in other research the advantage of traditional manufacturing employment vis-à-vis higher end service employment as vehicles for welfare improvements for those most in need (Felsenstein & Persky, 2007). In effect, such observations support the cautious application of traditional smokestack chasing by state and local economic development agencies. Similar conclusions might be drawn from the recent work by Greenstone and Morretti (2004) that finds substantial welfare gains from winning "million dollar plants." However, Blumenberg (1998) has raised reasonable concerns about the likely gender consequences of such traditional economic development activities.

The approach taken in this article lends itself to commenting on this debate. Much smokestack chasing has centered on interstate competition for large automobile plants. Recent work has pointed to the hospital industry as well suited for facilitating upward mobility among low-wage workers (Fitzgerald, 2006; Wolf-Powers & Nelson, 2010). This industry is conceived as promoting career-ladder programs as the demand for nurses and technicians is constant and geographically invariant (in contrast to auto plants, hospitals do not often relocate, downsize, or get bought out). Government underwrites this industry to a certain extent through its role

Table 10. Initial Jobs in Each of Two Industries by Wage–Gender Groups

	Wage Groups by Gender									
Welfare Gains	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
Autos	7.25%	2.90%	7.25%	4.35%	49.28%	14.49%	7.25%	1.45%	4.35%	1.45%
Hospitals	1.20%	0.00%	8.84%	24.90%	2.41%	20.88%	3.61%	31.33%	1.20%	5.62%

Table 11. Vacancies Generated by Each Wage–Gender Group: Auto Industry Employment

	Wage Groups by Gender: Autos Employment									
Vacancies	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
Male	23	3	22	5	118	7	15	0	7	0
Female	5	7	5	13	27	38	4	3	1	2

Table 12. Vacancies Generated by Each Wage–Gender Group: Hospital Industry Employment

	Wage Groups by Gender: Hospital Employment									
Vacancies	1M	1F	2M	2F	3M	3F	4M	4F	5M	5F
Male	4	0	26	27	6	10	7	10	2	1
Female	1	0	6	72	1	54	2	62	0	8

in reimbursing medical costs. This adds to the stability of the industry and creates fertile ground for the development of job chains and career ladders.

In the following exercise, we consider the impacts on male and female job chains that might be expected by subsidizing establishments of 100 workers in each of these industries. Using the same PSID sample as above, we determined the share of new employment in each industry that would be in each wage–gender group. This simple breakdown is presented in Table 10. The auto plant concentrates much of its hiring in occupations that fall in our mid-wage male occupations; almost half fall in 3M alone. The hospital hires many more workers into female jobs, with 2F, 3F, and 4F each accounting for more than 20% of all hires. This underscores the potential for upward female mobility and the development of career ladders in this sector.

With this as a starting point, we can predict the overall vacancies likely to be opened by each new facility. These are generated by the new jobs and the chains that they give rise to. In the auto industry, much of the initial employment is concentrated in middle-earnings male jobs (Group 3). These new jobs open up many ancillary Group 4 female vacancies as workers move from the latter to the former (Table 11). In the hospital industry, things look rather different. Nearly all initial employment is concentrated in female-type jobs at mid- to low-level wage scales (Groups 2, 3, and 4). These generate minimal male vacancies, whereas female vacancies seem to be positively correlated with wage groups. Group 2 jobs in the sector create proportionally more female vacancies than do jobs in the lower wage classes (Table 12).

Conclusion

This article has endeavored to outline the mechanics and application of an economic development tool sensitive to the issue of gender. Although current economic development discourse is sympathetic to issues of gender (Chapple, 2002; Oberhauser, 2002), economic development praxis lacks an analytic device to operationalize this sentiment. Our gendered job chains approach points to some preliminary conclusions. First, we note that female jobs generate chains similar in their characteristics to male jobs. Chain length and welfare effects are somewhat smaller. However, both types of jobs call on the unemployed in equal measure. Second, contrary to expectations, we find no indication that female jobs limit (or enhance) job mobility. Third, our findings indicate that while women participate far more in the welfare gains generated by female jobs, they are nevertheless underrepresented in the gains associated with new high-wage jobs, male and female. Finally, we offer a gendered perspective on the classic debate about manufacturing versus services. Our simulated example shows that service sector jobs generate more opportunities for female mobility than do typically male-type manufacturing jobs. Employment in service industries tends to create female vacancies across a spread of mid-range wage groups, with proportionally more vacancies at the higher end of the wage distribution.

These findings indicate some interesting social policy issues. Although earnings and labor force participation gender differentials may have narrowed somewhat over the years, this has been achieved through high levels of part-time participation in the labor force, with high levels of labor turnover and, correspondingly, low levels of job tenure and security. Female mobility in the labor market has been less career based and more incidental, based on movement in and out of the market as dictated by the cycle of marriage, motherhood, homemaking, and child rearing. Many of the social policy measures aimed at enhancing female labor market participation are attuned to a world of full-time work, distinct career paths, opportunities for continuous in-house training, and so on. These would need to be harmonized to meet the needs of careers based on punctuated work spells, movement in and out of the market, and flexible work practices.

The policy implications arising from our discussion of gender-based mobility span both the demand and supply sides of the labor market. On the demand side, the question arises as to the effectiveness of gender-based equal opportunity employment measures. Such efforts are primarily aimed at increasing the number of women moving into semiskilled male jobs. Just how far down the job chain does the gender effect of the vacancies generated by such moves really reach? Similarly, questions arise on the supply side. Can policy aimed at enhancing female flexibility in the labor market (such as worker transportation, on-site child care, flexi-hours) set off a chain of labor market mobility? And are such chains more or less likely to be set off by women currently in male jobs or women currently in female jobs? Although these issues are beyond the scope of the present article, they are certainly within the future remit of research examining the gender consequences of local economic development efforts.

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Notes

1. Worked examples, simulations, and extensions can be found in Persky and Felsenstein (2006, 2008).
2. It should be noted that our basic PSID sample period, 1987 to 1992, continues to retreat into the past. Meanwhile, the gender composition of occupations has evolved as women workers have spread over the economy. At best, therefore, the work reported here gives a snap shot in time. Unfortunately, our basic approach to identifying chains can no longer be directly applied to PSID data since those are now collected biannually. We are currently exploring other data sets.
3. Within-group *churning* (i.e., mobility to similar jobs) is a well-recorded phenomenon in the literature (Schettkat, 1996). Churning that includes residential mobility has been investigated in Persky et al. (2004).
4. This finding is consistent with the general view that in the modern economy, unskilled workers have little access to job ladders within companies.
5. This equation is based on Equation 4.4 in Persky et al. (2004).
6. Notice that for Group 5, by definition, all gains must be terminal gains.
7. The only way to empirically verify this assumption (or to avoid making it) would be to collect a very large sample of actual job chains, a difficult if not impossible task. In any event, we have no a priori reason to think that this assumption biases our estimates in any particular direction.

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