

Ports of Entry: The Norwegian Case

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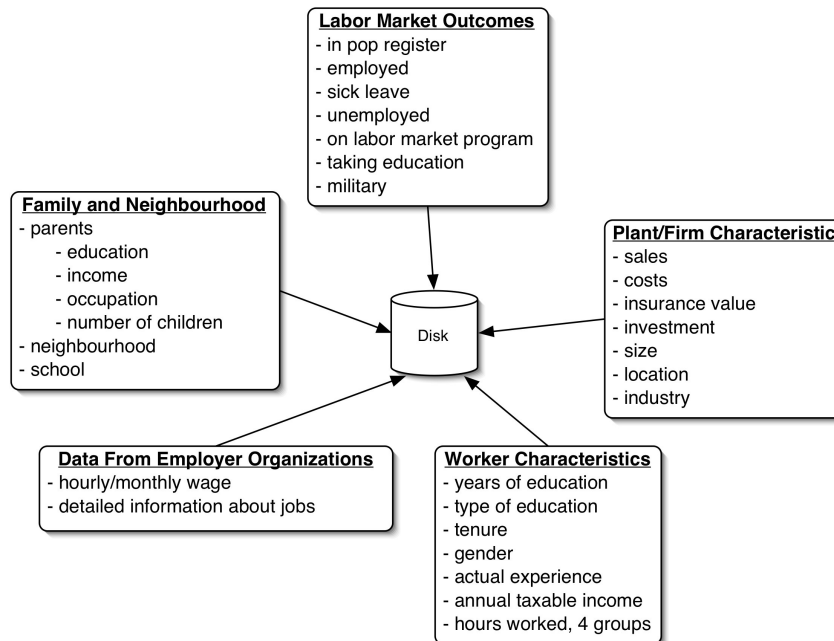
1 Introduction

This project—which is work in progress—looks at internal labor markets and especially Ports of Entry. The seminal reference on internal labor markets is Doeringer and Piore (1971). Their theory predicts that firms will recruit people into certain jobs (Ports of Entry) at the bottom of the firm hierarchy and promote workers into jobs higher up in the hierarchy. A recent empirical paper, with a nice introduction to the topic and which uses Swedish data, is Lazear and Oyer (2002). They find that “[...], at every level there remains significant hiring from the outside.” Our preliminary results are in line with this.

2 Data

In this paper we establish a new data set based on collected data by The Confederation of Norwegian Business and Industry (NHO). NHO has about 16,000 member companies which employ about 450,000 workers. The data collected by NHO is used in wage negotiations between NHO and different worker unions. Hence, it is reasonable to believe that the data is of very high quality. Our data set covers on average 98,000 white collar workers (except the CEO, and in larger firms, the vice CEO) in different industries during the period 1980-1997. We have information on wages and on each worker’s hierarchical level in the firm. Further, we have a four digit code giving detailed information about the job.

One of the great advantages with the new data set is that we are able to link approximately 97% of the individuals with other data sets that we have available. This existing administrative data set contains information about the whole population in Norway for the time span 1986-2000, as well as information about firms, i.e. a linked employer-employee data set. We have detailed information about education, family background, income and industry, for further description of the data see Salvanes and Førre (2003).



By merging these different data sets we have a unique database covering a wide range of different variables describing several dimensions of firms, individuals and their relationships. Further, since the data covers many firms in different sectors of the economy we are not constrained by the limitations of a case study with respect to generality, i.e. we will be able to observe whether there are differences between firms and industries.

Levels/hierarchy Each worker is assigned an occupational group and a level *within* the occupational group. The groups are labeled A-F: Group A is technical white collar workers; Group B is foremen; Group C is administration; Group D is shops and Group E is storage. Group F consists of the workers who are not picked up by the other groups. The level is indicated by a number where zero is the top level. In total we have 22 different combinations. These codes are made by the NHO and as such they are similar across firms and industries.

Establishment As the employer unit we use establishment/plant. Most likely this will result in an understatement of the reported results. We know that there is movement between plants within the same firm. In future work we will take this into account. We have the required information about ownership changes, but we have not had time to explore it yet. But we think this raises an important question: What is the correct employer unit to use when working with the internal labor market? Or, what is the correct decision unit with respect to hiring workers?

Methodology In year t we look at each worker and observe where he works and the hierarchical level he is at. Then we look at year $t - 1$ and observe the same variables. If

there is a change in the hierarchical level we further observe whether this change has taken place within the same plant (internal movement) or not (external movement).

Data used in this study In this paper we use data for the span 1986-1997. The tables below give some basic information about our sample. The first table gives the average number of firms per year. Firmsize is given by the numbers of white collar workers in the establishment. The second table gives the average number of workers per year by different hierarchical levels. Note that the levels A32 and A42 are similar to A31 and A41 with respect to complexity but that A32 and A42 do not involve supervision of other workers. Over the whole span there is 20494 different plants and 238850 different individuals at one point or another. The third table gives some information about the wages at each hierarchical level for the years 1986, 1991 and 1997.

<i>Firmsize</i>	<i>Number of white collar workers</i>	<i>Average number of establishments</i>
1	1-9	1307
2	10-49	1997
3	50-99	659
4	100+	1693
<i>Total</i>		5656

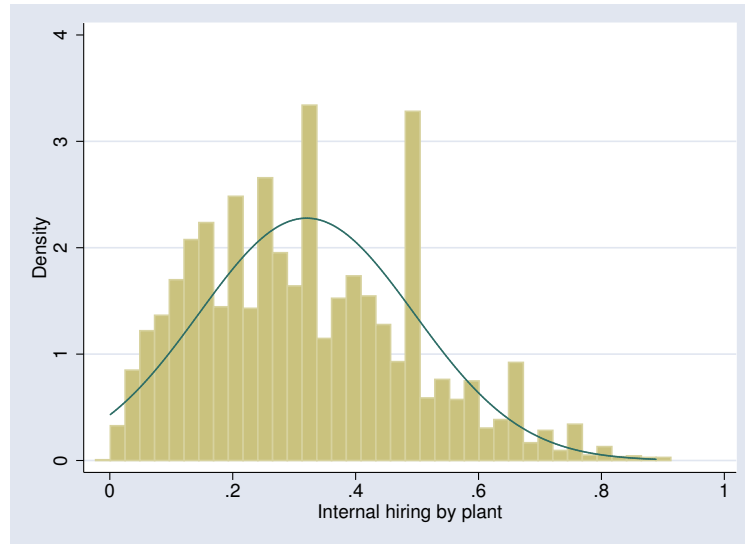
<i>Size</i>	<i>Level</i>										
	<i>A0</i>	<i>A1</i>	<i>A2</i>	<i>A31</i>	<i>A32</i>	<i>A41</i>	<i>A42</i>	<i>A5</i>	<i>A6</i>	<i>B1</i>	<i>B2</i>
1	13	75	186	173	157	52	228	104	27	135	286
2	77	337	736	688	755	207	936	541	234	234	695
3	63	273	586	573	697	183	811	483	222	89	306
4	322	2329	4451	2952	5464	864	4505	2690	987	279	877
<i>Total</i>	475	3015	5958	4387	7073	1306	6480	3818	1470	736	2164

<i>B3</i>	<i>Level</i>										<i>Total</i>
	<i>C0</i>	<i>C1</i>	<i>C2</i>	<i>C3</i>	<i>C4</i>	<i>D1</i>	<i>D2</i>	<i>E1</i>	<i>E2</i>	<i>F</i>	
590	46	417	667	986	709	57	200	128	206	724	6164
2101	199	1696	2064	2994	2160	134	531	443	808	2727	21296
1203	182	967	1434	1916	1210	34	138	174	347	1617	13508
3541	618	3343	5844	8138	3703	168	697	381	934	4434	57521
7435	1045	6422	10009	14034	7783	393	1566	1125	2295	9501	98489

<i>Level</i>	<i>1986</i>		<i>1991</i>		<i>1997</i>	
	<i>Mean</i>	<i>Std</i>	<i>Mean</i>	<i>Std</i>	<i>Mean</i>	<i>Std</i>
<i>A0</i>	31224	6383	40303	7195	51286	9420
<i>A1</i>	26153	3991	32346	4130	40326	5054
<i>A2</i>	21847	3578	27019	3742	34158	4479
<i>A31</i>	18575	3223	23139	3657	29163	4266
<i>A32</i>	17180	2923	22014	3652	27594	4302
<i>A41</i>	15166	2193	19043	2525	23520	2861
<i>A42</i>	14476	2203	18064	2553	22356	3011
<i>A5</i>	12932	1786	15892	2253	19167	2576
<i>A6</i>	11325	1885	14056	2792	16581	3646
<i>B1</i>	19351	5580	26313	4579	33070	5516
<i>B2</i>	15924	3365	20396	3201	25024	3235
<i>B3</i>	13935	1770	17482	2418	21258	2753
<i>C0</i>	29525	6320	39545	7721	50734	11422
<i>C1</i>	20587	4802	27654	4927	35531	5939
<i>C2</i>	15862	3332	20481	3436	25654	4269
<i>C3</i>	12158	1903	14952	2763	18782	3283
<i>C4</i>	10057	1490	11823	3159	14627	3616
<i>D1</i>	13201	2044	17760	2933	22200	3585
<i>D2</i>	9816	1582	10670	3989	11898	5225
<i>E1</i>	13445	2085	17443	2544	21660	3094
<i>E2</i>	10910	1487	13858	2112	16865	2682
<i>F</i>	13164	3657	15882	4923	19910	6762

3 Internal hiring

The first question we ask is to what extent the establishments in our sample hire people internally rather than from the outside? The figure below shows the distribution of the ratio between internal and total hiring for all establishments in our sample.



The mean of internal hiring is 0.32 (the standard deviation is 0.175), that is 32% of people hired into a job are already employed in the establishment. Panel A in the table below shows how the internal hiring differs between firmsize and Panel B shows internal hiring by industry.

<i>Panel A</i>		<i>Panel B</i>	
<i>Firmsize</i>	<i>Percent</i>	<i>Industry</i>	<i>Percent</i>
1	34.03	Oil/manufacturing (O/M)	33.92
2	30.97	Utilities (U)	26.29
3	32.22	Construction (C)	33.26
4	31.46	Services (S)	30.40

4 A first look at Ports of Entry

In the table below we have normalized the levels in each plant such that the lowest level observed in a given year is give the value 1. Further, we have organized the firms in groups by their number of levels. By doing this we are able to compare our results with Table 1 in Lazear and Oyer (2002).

<i>Group A: technical</i>								
<i>Level</i>	<i>Number of levels in the plant</i>							
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
<i>1</i>	18.85	24.92	26.56	22.06	22.06	27.40	16.74	21.01
<i>2</i>		33.37	34.04	30.79	28.27	27.24	23.41	24.85
<i>3</i>			33.86	36.96	35.00	32.17	25.46	23.17
<i>4</i>				36.53	36.17	42.03	35.27	27.39
<i>5</i>					35.90	39.39	41.67	42.66
<i>6</i>						41.25	46.66	35.69
<i>7</i>							43.44	34.55
<i>8</i>								41.22
<i>Number of plants</i>	2637	457	271	187	145	165	126	64

There are two striking differences between our results and the results in Lazear and Oyer (2002). The first difference is that in the Norwegian data there is a much lower internal hiring at most levels compared to the Swedish data. The second difference is that the internal hiring do not increase monotonic when we move up the corporate hierarchy, as predicted by the theory and as shown empirically in Lazear and Oyer (2002). Although there seems to be an increase in internal hiring when we move up the hierarchy there is in fact a decrease in internal hiring for some of the top levels.

When we look at Group B there is an increasing share of internal hiring the higher the level in the firm. Group C has the same characteristic as group A. The overall conclusion is that there seems to be a large external hiring at all levels in the firms. Further, the numbers reveal that there is a significant difference in internal hiring between Norwegian and Swedish establishments. We believe that an important explanation for this difference is that we use plant level data whereas Lazear and Oyer (2002) define internal labor markets by “families” of firms.

<i>Group B: foremen</i>				<i>Group C: administration</i>					
<i>Level</i>	<i>Number of levels</i>			<i>Level</i>	<i>Number of levels</i>				
	<i>1</i>	<i>2</i>	<i>3</i>		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>1</i>	22.54	19.08	13.17	<i>1</i>	13.19	20.55	21.79	20.65	20.83
<i>2</i>		46.49	37.71	<i>2</i>		29.02	32.23	30.99	27.67
<i>3</i>			44.36	<i>3</i>			30.79	36.98	33.64
				<i>4</i>				31.27	37.18
				<i>5</i>					33.88
<i>Plants</i>	1493	413	71	<i>Plants</i>	5225	1161	823	645	263

<i>Group D: shops</i>			<i>Group E: storage</i>		
	<i>Number of levels</i>			<i>Number of levels</i>	
<i>Level</i>	<i>1</i>	<i>2</i>	<i>Level</i>	<i>1</i>	<i>2</i>
<i>1</i>	14.67	9.66	<i>1</i>	24.49	18.62
<i>2</i>		27.64	<i>2</i>		39.30
<i>Plants</i>	704	278	<i>Plants</i>	594	179

5 Plant size and industry

In this section we ask whether there are differences in internal hiring across industries or plant size. Note that we now do not normalize the levels in the establishments, i.e. we use the observed levels. In brief, there seems not to be large differences between different plant sizes. When we look at different industries there seems to be somewhat larger differences. E.g. the internal hiring of workers into B1 ranges from 30% in Utilities to 48% in Oil/Manufacturing. Again we see the pattern that the highest internal recruitment is into middle management positions.

<i>Level</i>	<i>Overall</i>	<i>Firmsize</i>				<i>Industry</i>			
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>O/M</i>	<i>U</i>	<i>C</i>	<i>S</i>
<i>A6</i>	18.66	17.18	18.24	17.95	19.07	20.84	3.12	11.44	11.35
<i>A5</i>	23.97	22.43	23.50	23.20	24.32	27.29	9.57	17.89	17.80
<i>A42</i>	25.94	24.42	25.48	25.18	26.30	29.62	11.89	20.22	20.13
<i>A41</i>	35.51	33.99	35.06	34.76	35.88	39.05	21.33	29.65	29.56
<i>A32</i>	30.87	29.29	30.35	30.06	31.17	34.47	16.75	25.07	24.98
<i>A31</i>	43.79	42.30	43.36	43.07	44.18	47.25	29.53	37.85	37.76
<i>A2</i>	36.87	35.30	36.36	36.07	37.18	39.84	22.12	30.44	30.35
<i>A1</i>	40.38	38.76	39.82	39.53	40.65	42.91	25.18	33.51	33.41
<i>A0</i>	38.00	36.46	37.52	37.23	38.34	41.05	23.33	31.65	31.56
<i>B3</i>	17.12	15.84	16.91	16.61	17.73	21.00	3.28	11.60	11.51
<i>B2</i>	41.60	40.39	41.45	41.15	42.27	46.26	28.54	36.86	36.77
<i>B1</i>	43.97	42.79	43.85	43.55	44.67	47.78	30.06	38.38	38.29
<i>C4</i>	19.60	18.33	19.39	19.10	20.21	24.48	6.76	15.08	14.99
<i>C3</i>	28.90	27.54	28.60	28.31	29.42	33.88	16.16	24.48	24.39
<i>C2</i>	34.62	33.24	34.31	34.01	35.13	39.13	21.40	29.73	29.64
<i>C1</i>	33.37	32.00	33.07	32.77	33.89	37.42	19.70	28.02	27.93
<i>C0</i>	31.95	30.54	31.60	31.31	32.42	36.13	18.41	26.73	26.64
<i>D2</i>	11.23	10.00	11.06	10.77	11.89	19.42	1.70	10.02	9.93
<i>D1</i>	29.60	28.35	29.42	29.12	30.24	37.42	19.70	28.02	27.93
<i>E2</i>	19.97	18.75	19.82	19.52	20.64	26.38	8.66	16.98	16.89
<i>E1</i>	38.42	37.25	38.32	38.02	39.14	43.66	25.94	34.26	34.17
<i>F</i>	20.29	19.04	20.10	19.80	20.92	25.59	7.87	16.19	16.10

6 Levels across occupational groups

We now try to create a single hierarchy with eight levels in each plant across the occupational groups.¹ We further normalize the levels in each plants, and 1 is the lowest level and 8 is the highest level.

¹Level 1 = A6, C4, D2 and E2; Level 2 = A5 and F; Level 3 = A42, B3 and C3; Level 4 = A32, A41, D1 and E1; Level 5 = A31, B2 and C2; Level 6 = A2, B1 and C1; Level 7 = A1; Level 8 = A0.

<i>Level</i>	<i>Number of levels in the plant</i>							
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
<i>1</i>	7.49	20.97	27.73	25.02	22.85	21.34	20.18	19.16
<i>2</i>		37.36	44.18	43.07	37.35	33.61	29.03	22.99
<i>3</i>			52.59	53.13	47.72	41.98	32.14	24.69
<i>4</i>				56.51	54.88	53.36	42.82	30.66
<i>5</i>					56.31	56.06	48.43	40.05
<i>6</i>						54.00	47.25	39.84
<i>7</i>							50.93	45.64
<i>8</i>								41.69
<i>Number of plants</i>	10698	2439	1668	1427	1062	784	531	378

The table shows that there is almost a monotonic increase in internal hiring with the plant hierarchy. But still, the numbers are low compared to what the theory of internal labor markets predicts, i.e. at the top there should almost exclusively be internal hiring.

7 Heterogeneity in top/bottom

With the last table as a starting point we now look closer into the difference in internal hiring at top and bottom levels. To do this we look at plants with five levels or more. We then aggregate the two highest levels in the plant into the top level. Further, we aggregate the two lowest levels in the plant into the bottom level. Then we divide the share of internal hiring at the top level by the share of internal hiring at the bottom level. If this ratio is greater than 1 then there is more internal hiring at the top level than at the bottom level. We also impose the restriction that the number of observed transitions at the top level and the bottom level is 25 or more for each plant.

<i>Percentile</i>	<i>Top</i>	<i>Bottom</i>	<i>Top/Bottom</i>
<i>1</i>	0.00	0.00	0.31
<i>5</i>	0.09	0.03	0.74
<i>10</i>	0.19	0.08	0.91
<i>25</i>	0.39	0.17	1.22
<i>50</i>	0.60	0.31	1.68
<i>75</i>	0.73	0.47	2.64
<i>90</i>	0.84	0.63	4.57
<i>95</i>	0.89	0.70	6.14
<i>99</i>	0.96	0.80	12.19
<i>Mean</i>	0.55	0.33	2.39
<i>Standard deviation</i>	0.24	0.20	2.67

From the table we see that the average ratio is 2.39. That is, on average there is 2.39 as many internal hires at the top level as at the bottom level. The median is 1.68 and the standard deviation is 2.67. When we look at the numerator and the denominator there seems to be a puzzle that needs some further investigation: There is extensively internal hiring at the bottom level.

8 Conclusion and future work

Our preliminary results show that there is hard to find evidence in support of the institutional view of Ports of Entry. The plants in our sample hire significantly from the outside at every level. There seems to be an inverse U-shape in internal hiring when we move up the plant hierarchy with internal hiring at middle management positions being most prevalent. However, looking at the distribution of the ratio of internal hiring at top levels to bottom levels we find significant heterogeneity in hiring practices. Hence, some firms have internal labor markets with specific Ports of Entry.

In the work ahead we will explore the boundaries of the internal labor market utilizing firm level data. We will also explore firm heterogeneity more systematically and look at workers who move from blue collar to white collar jobs. Further, we will try to take advantage of the detailed four digit coding describing the specific job that the worker has.

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