Online appendix to “When does the stepping stone work? Fixed-term contracts versus temporary agency work in changing economic conditions”

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Abstract

This online Appendix contains supplementary descriptive statistics on gross yearly transitions and a specification controlling for observed heterogeneity, as well as several robustness checks including the description and the results of the Monte Carlo simulations.

1 Descriptive statistics

Table 1: Gross annual transitions (%)

Destination state → Initial state ↓	Unempl.	Open.	FTC	TAW	SE	Public	NP
Unemployed	45.5	12.8	8.7	4.6	5.0	4.8	18.6
Open-ended	2.1	92.0	0.8	0.3	0.5	0.4	3.9
FTC	14.6	25.1	41.5	3.0	2.2	2.7	10.8
TAW	20.3	17.8	10.2	39.7	1.7	2.0	8.3
Self-employed (SE)	2.8	3.5	1.2	0.4	87.3	0.4	4.5
Public	1.4	1.1	0.4	0.1	0.2	92.4	4.6
Non-participation (NP)	5.3	2.9	1.8	0.6	1.5	3.3	84.6

Source. LFS 2002 – 2010 (authors' calculations). *Sample.* 309,317 individuals – 1,689,915 observations.

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Table 2: Intensities of quarterly transitions between labor market states, relative to unemployment (2002-2010) - multinomial logit without fixed effects.

Destination state →	Open-ended	FTC	TAW	SE	Public	NP
Open-ended	3.769 (0.026)	0.411 (0.037)	0.013 (0.054)	0.782 (0.054)	0.575 (0.058)	1.131 (0.028)
FTC	1.324 (0.030)	2.162 (0.024)	−0.292 (0.052)	−0.218 (0.073)	−0.098 (0.067)	0.429 (0.031)
TAW	0.629 (0.045)	0.192 (0.043)	2.176 (0.032)	−0.494 (0.111)	−0.545 (0.117)	0.169 (0.050)
Self-employed (SE)	1.394 (0.049)	0.112 (0.062)	−0.574 (0.106)	4.462 (0.040)	−0.039 (0.117)	0.859 (0.042)
Public	0.751 (0.060)	−0.086 (0.070)	−0.526 (0.124)	0.151 (0.109)	4.552 (0.040)	1.411 (0.041)
Non-participation (NP)	0.577 (0.027)	0.069 (0.026)	−0.398 (0.040)	0.796 (0.037)	1.103 (0.035)	1.500 (0.018)
Women	−0.127 (0.019)	0.056 (0.020)	−0.180 (0.028)	−0.234 (0.027)	0.114 (0.028)	0.242 (0.016)
No high school diploma	−0.703 (0.024)	−0.829 (0.026)	−0.961 (0.039)	−0.083 (0.035)	−0.831 (0.033)	0.385 (0.019)
High school diploma	−0.336 (0.028)	−0.349 (0.028)	−0.429 (0.044)	0.177 (0.039)	−0.396 (0.036)	0.353 (0.023)
University diploma	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*
15-29	−0.237 (0.028)	0.510 (0.032)	0.712 (0.048)	−0.005 (0.038)	−0.228 (0.040)	−0.281 (0.023)
30-49	−0.174 (0.023)	0.184 (0.029)	0.445 (0.045)	−0.207 (0.034)	−0.139 (0.033)	−0.595 (0.020)
50-64	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*
Blue collars	0.942 (0.026)	1.293 (0.027)	2.361 (0.043)	−0.743 (0.038)	−0.256 (0.046)	−5.225 (0.077)
Clerks	1.213 (0.024)	1.313 (0.026)	1.086 (0.047)	−0.414 (0.035)	0.896 (0.032)	−3.665 (0.035)
Executives	0.796 (0.038)	0.830 (0.042)	−0.123 (0.103)	0.200 (0.054)	0.640 (0.050)	−2.953 (0.063)
Intermediates	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*	*ref.*
GDP Growth	0.008 (0.015)	−0.013 (0.015)	0.093 (0.022)	0.014 (0.022)	0.021 (0.022)	0.012 (0.013)
Intercept	−1.967 (0.036)	−2.108 (0.040)	−3.178 (0.062)	−2.259 (0.050)	−2.478 (0.050)	0.098 (0.028)

Source. LFS $2002-2010$ (authors' calculations). *Sample.* $309,317$ individuals – $1,689,915$ observations. *Note.* The reference state is unemployment.

Table 3: From temporary employment to open-ended contracts (cross-sectional Logit)

	FTC	TAW	FTC	TAW
	I	II	III	IV
Intercept	−4.20	−3.62	−0.13	−1.38
	(0.71)	(1.12)	(0.89)	(1.40)
Overtime work	0.66	0.46	0.61	−0.13
	(0.15)	(0.24)	(0.20)	(0.14)
Women	−0.06	−0.16	0.09	−0.34
	(0.14)	(0.23)	(0.17)	(0.27)
Men	*ref.*	*ref.*	*ref.*	*ref.*
Age	0.05	0.06	−0.05	0.12
	(0.04)	(0.06)	(0.05)	(0.08)
Age^2	−0.001	−0.001	0.001	−0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Blue collars	1.02	−1.15	0.47	−1.51
	(0.35)	(0.61)	(0.40)	(0.78)
Clerks	1.06	−0.71	0.65	−1.06
	(0.33)	(0.63)	(0.37)	(0.79)
Intermediates	1.02	−0.97	1.02	−1.08
	(0.33)	(0.63)	(0.38)	(0.82)
Executives	*ref.*	*ref.*	*ref.*	*ref.*
Agriculture	−0.48	.	−0.88	.
	(0.44)	(.)	(0.48)	(.)
Manufacturing	0.22	−0.39	0.58	−0.32
	(0.20)	(0.24)	(0.27)	(0.27)
Construction	−0.02	−0.89	−0.03	−0.64
	(0.32)	(0.41)	(0.38)	(0.45)
Services	*ref.*	*ref.*	*ref.*	*ref.*
High school diploma	−0.30	0.53	−0.39	0.32
	(0.17)	(0.24)	(0.23)	(0.37)
University diploma	0.08	0.28	−0.21	−0.40
	(0.17)	(0.30)	(0.22)	(0.35)
No diploma	*ref.*	*ref.*	*ref.*	*ref.*
Growth rate	0.02	−0.12	0.02	−0.13
	(0.09)	(0.13)	(0.10)	(0.14)
Number of observations	3,687	1,786	818	430

Source. LFS 2002 − 2010.

I,II: estimates for open-ended contract *versus* all other states

III,IV: estimates for open-ended contract *versus* unemployment

Table 4: Intensities of quarterly transitions between labor market states, relative to unemployment (aggregating FTC and TAW, 2002-2010)

Destination state → Initial state ↓	Open-ended	ST	SE	Public	NP
Open-ended	3.459 (0.083)	0.239 (0.082)	0.704 (0.190)	0.238 (0.221)	0.744 (0.077)
Short-term (ST)	0.663 (0.074)	1.405 (0.049)	−0.062 (0.153)	−0.241 (0.151)	0.139 (0.061)
Self-employed (SE)	0.910 (0.161)	−0.046 (0.148)	3.335 (0.129)	0.321 (0.359)	0.773 (0.116)
Public	0.327 (0.224)	−0.164 (0.161)	−0.081 (0.303)	2.922 (0.136)	0.387 (0.120)
Non-participation (NP)	0.337 (0.076)	−0.068 (0.058)	0.656 (0.100)	0.350 (0.105)	1.368 (0.040)
GDP Growth	0.040 (0.068)	0.052 (0.047)	0.141 (0.094)	0.214 (0.105)	0.011 (0.040)

Source. LFS $2002-2010$ (authors' calculations). *Sample.* $43,657$ "movers". *Note.* The reference state is unemployment. The state "Short-term" aggregates FTC and TAW.

2 Robustness checks I: Monte Carlo simulations

To investigate further the finite sample properties of the estimator in the model with time-varying covariate, we resort to Monte Carlo simulations. First, we provide some empirical evidence about the asymptotic behavior of $\hat{\beta}$ with respect to Q, the number of distinct quarters in our sequences. Second, we try to determine whether our sample size is large enough to make the asymptotic bias C negligible or not. Third, we document the potential bias due to the omission of the time-varying covariate in the estimation of a specification that does not include such a covariate.

We simulate a data-generating process as close as possible to the one of our data. We generate a rotating panel over Q quarters. A new sample of N individuals is introduced every quarter. Individuals are supposed to be observed T consecutive quarters. The sample size is $N(Q-T+1)$. Since the estimator relies on "movers" only, the sample size used for estimation is much smaller. When $T=4$, the sample of "movers" represents only about 25% of the generated sample. All our experimental results are based on $1,000$ replications of a model corresponding to the one described in Subsection 4.1 with $J+1=7$ states. We denote by $(x_q)_{q=1,\dots,Q}$ the time-varying and quarter-specific covariate. We use the actual growth rate to insure that simulations reproduce accurately the time series properties of this covariate and do not falsely improve the results of the simulations. For each individual $i \in [\![1\,;N]\!]$ who enters the sample at period q and $\forall j \in [\![0\,;J]\!]$, we draw i.i.d terms ϵ_{ij0} from a type I extreme-value distribution over individuals i and states j. We compute $y^*_{ij0} = \alpha_{ij} + x_{i,q-1}\beta_j + \epsilon_{ij0}$ and set the initial state to $y_{i0} = \arg\max_j y^*_{ij0}$. Then we simulate $\forall t \in [\![1\,;T]\!]$, $y_{it} = \arg\max_j y^*_{ijt}$, where $\forall j \in [\![0\,;J]\!]$,

$$y^*_{ijt} = \sum_{k=0}^{J} \delta_{kj} \mathbb{1}\{y_{i,t-1} = k\} + \alpha_{ij} + x_{t+q}\beta_j + \epsilon_{ijt}. \tag{1}$$

ϵ_{ijt} is i.i.d. type I extreme-value distributed over individuals i, states j and time t. The fixed-effects α_{ij} are also i.i.d with distribution $N(0, \pi^2/6)$, a variance of the same magnitude as the one of the perturbation term ϵ_{ijt}. We consider several designs differing in the length of the panel Q, the sample size of the entrants N, the correlation between individual- and state-specific fixed-effect α_{ij} and the time-varying covariate x_{t+q}. In our benchmark design, we set $T=4$, which is the shortest length of the panel required for the estimation and the least favorable case regarding the precision of estimates. We also investigate the case where $T=6$, the maximal length of individual trajectories in our panel. Since we consider $J+1=7$ states, our model has 42 parameters.[1] The true parameters in the main specification are given in the second columns of Table 5 (δ) and of Table 6 (β). We impose a rather strong inertia, consistently with the empirical evidence: we set much higher terms δ_{jj} than the coefficients δ_{kj} where $k \neq j$. For the same reason, we also assume that the persistence is more pronounced for some states. Finally, we impose in the benchmark design that the impact of the time-varying covariate, depending on β, is of the same magnitude as the state dependence, depending on δ. In an alternative design, we use a specification where this impact is ten times higher.

For the sake of clarity, we do not report the 42 parameters of the full model for each Monte Carlo experiment except once in Tables 5 and 6.[2] For each parameter, the relative bias is of the same magnitude. In what follows, we report only the average biases related to the diagonal terms δ_{jj} of the state dependence matrix, to the off-diagonal terms δ_{kj} and to the coefficients β_j.[3]

Tables 5 and 6 display the results of our simulations with the size of the quarterly new sample set at $N = 10,000$, making the length of the panel Q vary from 4, 12, 16, 32 to 64. We provide the average bias of the estimator, as well as its root mean squared error (RMSE) and its median absolute error (MAE). The bias decreases with the length of the panel Q as expected. More precisely, the MAE corresponding to state dependence parameters δ decreases at the expected rate $(Q - T)^{-\frac{2}{5}}$. The biases for the parameters β related to the time-varying covariate decrease at a much slower rate. However, and more importantly, these biases are small for values of Q close to the ones of our estimations. When $Q = 36$, which corresponds to the whole period 2002-2010, the average biases are always of 10^{-3} order and the MAE is about 10^{-2}. When $Q = 12$, as is the case for 2004-2006 and 2008-2010 subperiods, the MAE is twice higher but the average bias is still low.

To check the asymptotic behavior of the estimator with respect to the sample size of new entrants N, we make it vary from 250, 500, 5,000 to 10,000. Table 7 provides the results of these Monte Carlo simulations. The performance of the estimator increases with the sample size. When $N = 250$, the RMSE is as high as unity, and the maximum absolute bias has the same dimension as the true values. The poor properties of the estimator are explained by the small size of the sample actually used for estimates –about 650 "movers". This bias decreases with the sample size at a pace close to the predicted one. The ratio of the MAE observed for $N_1 = 10,000$ and $N_2 = 250$ is close to $\left(\frac{N_1}{N_2}\right)^{-\frac{2}{5}} \approx 0.23$. Since we dispose of more than $10,000$

[1] J parameters in β measuring the impact of the time-varying covariate, and J^2 parameters of state dependence δ.

[2] Estimates are performed using the macro provided by Aeberhardt and Davezies (2012).

[3] The full Tables are available upon request.

“movers” in the worst case, these results suggest reassuringly that our number of observations is large enough to be free of worry about the asymptotic bias C.

As expected, the precision increases when we use more observations per individual, since the probability of observing a transition, and thus the sample size of “movers”, increases with T. When $T = 6$, with a sample size comparable to ours, the RMSE is smaller by two compared to the one obtained on a shorter panel (see Table 8).

These Monte Carlo simulations suggest therefore that in our setting the number of observations is high enough not to cause concern about the asymptotics of the time-varying covariate in the number of quarters Q, the asymptotic bias C, and the slowness of the convergence of the weighted estimator as well.

In order to quantify now the bias due to the omission of the time-varying covariate, we estimate the model without this covariate using formula (6). Results are given in Table 9. The omitted variable bias is small and decreases rapidly with Q. In another design where the time-varying covariate has a higher impact on transitions (the true values are 10 times the values used for the benchmark design), the estimator is seriously biased when the specification of the transitions omits to take the time-varying covariate into account. By contrast, the MAE turns out to be rather small in that case.

The benchmark specification assumes that the distribution of unobserved heterogeneity terms α_{ij} is independent from the time-varying covariate. However, adding a correlation between the business cycle and individual propensities for being in one state would make sense: think of individuals who may place higher value on temporary jobs in economic downturns, when their employment prospects are poor. As a further robustness check, we allow for this kind of correlation by making the unobserved components vary according to the average GDP growth $\bar{x}$ on the periods where an individual is observed. We therefore set $\alpha_{ij} \sim N(\bar{x}, \pi^2/6)$. The results of the simulations are provided in Table 10. We find that allowing for such a correlation does not alter the magnitude of the bias of the estimates.

Table 5: Monte Carlo simulations, state-dependence parameters δ (N=10,000, T=4)

	True	Q=4			Q=12			Q=16			Q=32			Q=64		
	Values	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE
δ_{11}	3.5	-0.123	0.563	0.367	-0.017	0.181	0.123	-0.007	0.146	0.099	-0.002	0.105	0.072	-0.007	0.071	0.049
δ_{12}	0.3	0.011	0.536	0.355	-0.004	0.154	0.108	0.005	0.133	0.091	0.002	0.091	0.063	-0.004	0.064	0.042
δ_{13}	0.2	0.010	0.531	0.359	0.002	0.159	0.106	0.004	0.138	0.095	-0.000	0.089	0.058	-0.002	0.063	0.043
δ_{14}	0.7	-0.027	0.595	0.391	-0.003	0.175	0.119	-0.002	0.153	0.105	-0.003	0.102	0.067	-0.002	0.071	0.047
δ_{15}	0.2	0.007	0.623	0.376	-0.001	0.197	0.130	0.007	0.160	0.110	-0.002	0.102	0.067	-0.003	0.072	0.050
δ_{16}	0.7	-0.036	0.503	0.324	-0.003	0.151	0.102	0.005	0.124	0.086	-0.001	0.086	0.056	-0.001	0.059	0.039
δ_{21}	0.8	-0.036	0.469	0.314	-0.001	0.144	0.094	0.003	0.120	0.084	0.001	0.084	0.060	-0.004	0.058	0.039
δ_{22}	1.8	-0.070	0.450	0.297	-0.007	0.133	0.091	-0.001	0.115	0.079	0.000	0.075	0.051	-0.002	0.052	0.034
δ_{23}	-0.3	-0.005	0.434	0.286	-0.002	0.127	0.088	0.001	0.111	0.072	0.000	0.076	0.052	-0.001	0.049	0.035
δ_{24}	-0.03	-0.013	0.522	0.345	0.004	0.155	0.106	0.007	0.128	0.085	0.003	0.084	0.058	0.003	0.058	0.039
δ_{25}	-0.2	-0.011	0.535	0.360	-0.000	0.160	0.112	0.005	0.135	0.093	0.000	0.090	0.061	0.000	0.061	0.040
δ_{26}	0.2	-0.027	0.427	0.291	0.001	0.127	0.085	0.007	0.105	0.069	0.002	0.073	0.052	0.001	0.049	0.034
δ_{31}	0.3	-0.014	0.483	0.328	0.002	0.145	0.095	-0.008	0.121	0.077	-0.002	0.082	0.055	-0.003	0.058	0.038
δ_{32}	0.3	-0.023	0.429	0.284	-0.008	0.122	0.084	-0.006	0.107	0.072	-0.001	0.073	0.049	-0.002	0.050	0.035
δ_{33}	1.3	-0.061	0.431	0.294	-0.004	0.123	0.088	-0.003	0.107	0.076	-0.002	0.072	0.048	-0.001	0.051	0.033
δ_{34}	-0.4	0.021	0.529	0.356	0.009	0.156	0.109	0.000	0.129	0.087	0.004	0.087	0.055	0.001	0.060	0.038
δ_{35}	-0.3	-0.005	0.521	0.333	0.009	0.152	0.104	0.002	0.129	0.086	0.002	0.086	0.057	0.001	0.059	0.041
δ_{36}	-0.05	-0.034	0.419	0.267	0.001	0.124	0.084	-0.002	0.108	0.071	-0.001	0.072	0.048	0.000	0.050	0.033
δ_{41}	0.8	-0.015	0.582	0.387	0.006	0.172	0.117	-0.005	0.151	0.104	-0.000	0.098	0.066	-0.003	0.068	0.046
δ_{42}	0.4	-0.013	0.527	0.354	-0.006	0.162	0.108	0.003	0.133	0.088	0.001	0.089	0.060	0.002	0.063	0.045
δ_{43}	-0.4	0.041	0.575	0.394	0.003	0.172	0.124	0.000	0.140	0.091	0.000	0.099	0.066	0.001	0.063	0.044
δ_{44}	3.3	-0.142	0.587	0.401	-0.007	0.175	0.116	-0.005	0.146	0.099	-0.002	0.097	0.066	-0.001	0.068	0.046
δ_{45}	0.4	-0.043	0.615	0.408	0.003	0.186	0.129	0.004	0.155	0.105	0.002	0.101	0.067	0.001	0.069	0.046
δ_{46}	0.9	-0.065	0.489	0.334	-0.003	0.145	0.096	0.000	0.123	0.080	-0.001	0.080	0.055	0.000	0.054	0.037
δ_{51}	0.3	-0.005	0.593	0.416	-0.003	0.183	0.122	-0.005	0.149	0.095	-0.002	0.102	0.066	-0.004	0.071	0.046
δ_{52}	-0.1	-0.008	0.531	0.362	-0.002	0.168	0.118	-0.001	0.143	0.097	-0.001	0.090	0.059	-0.002	0.064	0.042
δ_{53}	-0.5	0.010	0.531	0.354	0.002	0.172	0.113	0.003	0.143	0.098	0.002	0.095	0.064	-0.001	0.065	0.044
δ_{54}	0.1	-0.018	0.589	0.393	0.015	0.186	0.126	0.002	0.157	0.106	0.001	0.099	0.068	0.003	0.073	0.047
δ_{55}	3	-0.148	0.586	0.399	-0.009	0.181	0.121	-0.011	0.153	0.103	-0.001	0.102	0.066	-0.001	0.068	0.047
δ_{56}	0.4	-0.037	0.483	0.327	-0.004	0.150	0.103	-0.004	0.123	0.080	-0.000	0.082	0.054	-0.001	0.058	0.038
δ_{61}	0.3	-0.013	0.470	0.328	-0.001	0.143	0.097	-0.002	0.117	0.079	0.001	0.081	0.056	-0.001	0.054	0.035
δ_{62}	0.1	-0.019	0.421	0.277	-0.004	0.126	0.087	0.000	0.104	0.068	0.000	0.070	0.047	0.001	0.050	0.034
δ_{63}	-0.3	0.001	0.408	0.248	-0.000	0.127	0.087	-0.002	0.106	0.070	0.001	0.071	0.048	0.002	0.048	0.032
δ_{64}	0.9	-0.067	0.452	0.297	-0.003	0.139	0.096	-0.006	0.112	0.076	0.001	0.074	0.048	0.001	0.053	0.036
δ_{65}	0.3	-0.048	0.477	0.314	-0.003	0.145	0.100	-0.005	0.120	0.082	0.000	0.078	0.051	-0.001	0.055	0.038
δ_{66}	1.4	-0.078	0.417	0.279	-0.007	0.127	0.086	-0.004	0.100	0.064	-0.001	0.070	0.046	0.001	0.048	0.032

Table 6: Monte Carlo simulations, time-varying covariate parameters β (N=10,000, T=4)

	True	Q=4			Q=12			Q=16			Q=32			Q=64		
	Values	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE
β_1	0.05	0.003	0.872	0.595	0.003	0.074	0.053	-0.002	0.073	0.051	0.009	0.053	0.037	0.009	0.046	0.029
β_2	0.02	-0.022	0.779	0.538	0.001	0.064	0.044	0.001	0.058	0.040	0.009	0.045	0.030	0.011	0.036	0.026
β_3	0.15	-0.002	0.784	0.504	0.002	0.066	0.046	-0.001	0.057	0.040	-0.001	0.046	0.031	-0.003	0.038	0.026
β_4	0.15	0.002	0.882	0.620	0.000	0.076	0.051	-0.002	0.069	0.046	-0.008	0.054	0.038	-0.008	0.044	0.028
β_5	0.25	-0.017	0.937	0.656	0.002	0.084	0.056	-0.007	0.077	0.051	-0.026	0.058	0.043	-0.027	0.047	0.036
β_6	0.02	-0.025	0.720	0.485	0.002	0.059	0.041	-0.001	0.055	0.037	0.004	0.042	0.029	0.006	0.035	0.024

Table 7: Monte Carlo simulations, benchmark simulations (T=4)

		Q=4			Q=12			Q=16			Q=32			Q=64		
Results for	N	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE
$\bar{\bar{\beta}}_k$	250	2.812	169.201	102.052	-0.040	0.607	0.378	-0.019	0.501	0.328	-0.013	0.349	0.234	-0.018	0.262	0.177
	500	-2.422	113.083	6.317	-0.012	0.351	0.230	-0.008	0.310	0.207	-0.003	0.236	0.159	-0.013	0.182	0.124
	5,000	0.008	1.222	0.814	0.002	0.100	0.068	-0.002	0.092	0.063	-0.003	0.071	0.049	-0.004	0.058	0.040
	10,000	-0.010	0.829	0.566	0.002	0.071	0.048	-0.002	0.065	0.044	-0.002	0.050	0.035	-0.002	0.041	0.028
$\bar{\bar{\delta}}_{kk}$	250	-15.820	84.659	37.338	-1.107	2.784	0.966	-0.548	1.597	0.720	-0.152	0.631	0.407	-0.052	0.401	0.265
	500	-34.748	74.744	38.836	-0.280	0.961	0.549	-0.180	0.693	0.441	-0.059	0.407	0.275	-0.024	0.275	0.185
	5,000	-0.249	0.861	0.520	-0.019	0.222	0.147	-0.014	0.182	0.122	-0.004	0.122	0.081	-0.003	0.085	0.056
	10,000	-0.104	0.506	0.340	-0.008	0.153	0.104	-0.005	0.128	0.087	-0.001	0.087	0.058	-0.002	0.059	0.040
$\bar{\bar{\delta}}_{kj}$	250	0.427	102.208	48.726	0.009	1.720	0.837	-0.054	1.063	0.640	-0.022	0.568	0.376	0.001	0.378	0.253
	500	-5.600	81.882	32.466	-0.015	0.748	0.488	-0.020	0.598	0.398	-0.003	0.379	0.255	0.001	0.261	0.176
	5,000	-0.033	0.855	0.566	0.001	0.202	0.136	-0.002	0.170	0.114	0.000	0.113	0.077	-0.001	0.081	0.055
	10,000	-0.015	0.563	0.377	0.000	0.140	0.096	-0.000	0.119	0.080	-0.000	0.080	0.054	-0.001	0.056	0.038

Table 8: Monte Carlo Simulations, benchmark design (T=6)

		Q=6			Q=12			Q=16			Q=32			Q=64		
Results for	N	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE
$\bar{\bar{\beta}}_k$	250	0.341	12.768	2.904	-0.003	0.214	0.146	-0.002	0.176	0.121	-0.003	0.157	0.106	0.007	0.119	0.081
	500	-0.075	2.266	1.455	-0.008	0.147	0.099	0.004	0.123	0.082	0.002	0.109	0.073	0.004	0.086	0.058
	5,000	-0.021	0.578	0.384	0.003	0.045	0.031	0.003	0.038	0.027	0.002	0.034	0.023	0.001	0.027	0.019
	10,000	-0.021	0.578	0.384	0.003	0.032	0.022	0.004	0.027	0.020	0.002	0.024	0.016	0.002	0.019	0.013
$\bar{\bar{\delta}}_{kk}$	250	-14.427	47.013	6.159	-0.103	0.642	0.429	-0.077	0.504	0.338	-0.022	0.311	0.211	-0.016	0.208	0.141
	500	-0.901	2.928	1.117	-0.048	0.435	0.291	-0.028	0.349	0.231	-0.010	0.219	0.146	-0.005	0.149	0.102
	5,000	-0.038	0.362	0.240	-0.006	0.132	0.088	-0.003	0.104	0.071	-0.002	0.068	0.046	-0.002	0.046	0.031
	10,000	-0.038	0.362	0.240	0.000	0.092	0.062	-0.000	0.074	0.050	-0.001	0.048	0.032	-0.000	0.033	0.022
$\bar{\bar{\delta}}_{kj}$	250	-1.174	40.319	6.067	-0.003	0.603	0.399	-0.005	0.466	0.315	0.002	0.292	0.195	-0.003	0.200	0.134
	500	-0.104	2.897	1.202	-0.002	0.405	0.271	0.004	0.321	0.215	0.002	0.205	0.137	0.001	0.141	0.096
	5,000	-0.006	0.408	0.272	-0.002	0.121	0.081	0.000	0.098	0.066	-0.001	0.064	0.043	-0.001	0.044	0.030
	10,000	-0.006	0.408	0.272	0.001	0.085	0.057	0.001	0.069	0.047	-0.001	0.045	0.031	-0.000	0.031	0.021

Table 9: Alternative estimators not controlling for any time-varying covariate (N=10,000)

		Q=4			Q=12			Q=16			Q=32			Q=64		
Results for		Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE
$\bar{\hat{\delta}}_{kk}$	Weighted Est.	-0.104	0.506	0.340	-0.008	0.153	0.104	-0.005	0.128	0.087	-0.001	0.087	0.058	-0.002	0.059	0.040
	Unweighted Est.	-0.087	0.501	0.335	-0.013	0.150	0.102	-0.006	0.125	0.084	-0.002	0.085	0.057	-0.002	0.059	0.040
True $\beta_0' = 10.\beta_0$	Weighted Est.	-0.150	0.718	0.474	0.070	0.139	0.137	0.056	0.121	0.115	0.036	0.098	0.086	0.024	0.074	0.062
	Unweighted Est.	-0.071	0.708	0.464	-0.208	0.126	0.222	-0.193	0.112	0.206	-0.110	0.091	0.122	-0.062	0.070	0.078
$\bar{\hat{\delta}}_{kj}$	Weighted Est.	-0.015	0.563	0.377	0.000	0.140	0.096	-0.000	0.119	0.080	-0.000	0.080	0.054	-0.001	0.056	0.038
	Unweighted Est.	-0.010	0.504	0.336	-0.004	0.150	0.102	-0.000	0.127	0.085	-0.001	0.085	0.057	-0.001	0.059	0.040
True $\beta_0' = 10.\beta_0$	Weighted Est.	-0.042	0.760	0.499	-0.000	0.133	0.101	-0.004	0.116	0.088	-0.015	0.091	0.079	-0.015	0.069	0.066
	Unweighted Est.	0.013	0.699	0.462	-0.184	0.129	0.195	-0.170	0.115	0.180	-0.130	0.091	0.135	-0.085	0.069	0.091

Table 10: Monte Carlo Simulations, alternative specification for the distribution of unobserved heterogeneity (T=4)

		Q=4			Q=12			Q=16			Q=32			Q=64		
Results for	α	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE	Bias	RMSE	MAE
$\bar{\hat{\delta}}_{kk}$	$N(0, \pi^2/6)$	-0.104	0.506	0.340	-0.008	0.153	0.104	-0.005	0.128	0.087	-0.001	0.087	0.058	-0.002	0.059	0.040
	$N(\bar{x}, \pi^2/6)$	-0.122	0.663	0.440	-0.008	0.128	0.087	-0.006	0.112	0.078	-0.003	0.090	0.060	-0.003	0.068	0.047
$\bar{\hat{\delta}}_{kj}$	$N(0, \pi^2/6)$	-0.015	0.563	0.377	0.000	0.140	0.096	-0.000	0.119	0.080	-0.000	0.080	0.054	-0.001	0.056	0.038
	$N(\bar{x}, \pi^2/6)$	-0.024	0.701	0.468	0.000	0.121	0.081	-0.001	0.105	0.071	-0.001	0.082	0.056	-0.002	0.063	0.043
$\bar{\hat{\beta}}_k$	$N(0, \pi^2/6)$	-0.010	0.829	0.566	0.002	0.071	0.048	-0.002	0.065	0.044	-0.002	0.050	0.035	-0.002	0.041	0.028
	$N(\bar{x}, \pi^2/6)$	-0.004	0.928	0.630	0.002	0.058	0.038	-0.001	0.055	0.037	0.000	0.046	0.032	-0.002	0.040	0.028

3 Robustness checks II: weighted and unweighted estimates

Table 11: Description of the sample of "movers"

	unweighted sample	weighted sample
Unemployed	25.2 (43.4)	22.9 (42.0)
Open-ended	19.0 (39.2)	20.2 (40.1)
FTC	9.0 (28.6)	8.9 (28.5)
TAW	4.9 (21.6)	4.8 (21.3)
Self-employed	6.5 (24.6)	6.7 (24.9)
Public	6.4 (24.5)	7.0 (25.4)
Non-participation	29.1 (45.4)	29.7 (45.7)
Women	54.9 (49.8)	55.4 (49.7)
15-29	30.8 (46.2)	30.1 (45.9)
30-49	50.9 (50.0)	50.1 (50.0)
50-64	18.3 (38.7)	19.8 (39.9)
No high school diploma	58.4 (49.3)	58.1 (49.3)
High school diploma	21.4 (41.0)	21.9 (41.3)
University diploma	20.1 (40.1)	20.1 (40.1)
Blue-collars	35.1 (41.6)	34.5 (41.3)
Clerks	36.7 (42.2)	37.2 (42.4)
Intermediates	19.2 (32.7)	19.3 (32.8)
Executives	9.0 (23.2)	9.0 (23.1)
Sum of weights	44,033	16,407

Source. LFS 2002 – 2010 (authors' calculations). *Sample.* 44,033 "movers".
Note. The weights correspond to those in formula (8).

Table 12: Intensities of quarterly transitions between labor market states, relative to unemployment (unweighted estimator, not controlling for the growth rate, 2002-2010)

Destination state → Initial state ↓	Open-ended	FTC	TAW	SE	Public	NP
Open-ended	3.482 (0.058)	0.338 (0.070)	0.191 (0.098)	0.622 (0.140)	0.296 (0.140)	0.752 (0.052)
FTC	0.860 (0.060)	1.753 (0.045)	−0.292 (0.080)	0.076 (0.125)	−0.133 (0.117)	0.322 (0.050)
TAW	0.461 (0.092)	0.313 (0.070)	1.415 (0.055)	−0.130 (0.219)	−0.029 (0.202)	0.126 (0.076)
Self-employed (SE)	0.864 (0.119)	0.152 (0.115)	−0.283 (0.189)	3.439 (0.083)	0.482 (0.225)	0.860 (0.081)
Public	0.480 (0.149)	0.075 (0.125)	−0.008 (0.233)	0.398 (0.244)	2.902 (0.085)	0.533 (0.075)
Non-participation (NP)	0.324 (0.060)	0.096 (0.048)	−0.109 (0.070)	0.736 (0.073)	0.273 (0.065)	1.398 (0.030)

Source. LFS 2002 − 2010 (authors' calculations). *Sample.* 44,033 "movers". *Note.* The reference state is unemployment.

Table 13: Intensities of quarterly transitions between labor market states, relative to unemployment (weighted estimator, not controlling for the growth rate, 2002-2010)

Destination state → Initial state ↓	Open-ended	FTC	TAW	SE	Public	NP
Open-ended	3.465 (0.085)	0.323 (0.094)	0.149 (0.142)	0.710 (0.192)	0.237 (0.219)	0.749 (0.079)
FTC	0.806 (0.085)	1.781 (0.065)	−0.282 (0.111)	−0.028 (0.183)	−0.210 (0.169)	0.246 (0.071)
TAW	0.298 (0.127)	0.291 (0.097)	1.331 (0.081)	−0.043 (0.289)	−0.257 (0.274)	−0.042 (0.105)
Self-employed (SE)	0.925 (0.161)	0.185 (0.184)	−0.546 (0.249)	3.344 (0.129)	0.316 (0.359)	0.790 (0.118)
Public	0.345 (0.214)	−0.051 (0.180)	−0.492 (0.279)	−0.096 (0.302)	2.916 (0.129)	0.395 (0.111)
Non-participation (NP)	0.344 (0.079)	0.049 (0.065)	−0.274 (0.100)	0.662 (0.100)	0.341 (0.101)	1.374 (0.041)

Source. LFS 2002 − 2010 (authors' calculations). *Sample.* 16,407 "movers". *Note.* The reference state is unemployment.

4 Robustness check III: nonlinear specifications for the GDP growth rate

Table 14: Intensities of quarterly transitions between labor market states, relative to unemployment (2002-2010)

Destination state → Initial state ↓	Open-ended	FTC	TAW	SE	Public	NP
Open-ended	3.668 (0.085)	0.273 (0.100)	0.259 (0.149)	0.785 (0.203)	0.190 (0.220)	0.831 (0.081)
FTC	0.810 (0.087)	1.695 (0.066)	−0.272 (0.108)	−0.024 (0.197)	−0.223 (0.181)	0.199 (0.073)
TAW	0.359 (0.124)	0.166 (0.099)	1.399 (0.081)	−0.038 (0.291)	−0.317 (0.261)	−0.022 (0.106)
Self-employed (SE)	0.963 (0.169)	0.192 (0.181)	−0.467 (0.285)	3.614 (0.132)	0.220 (0.391)	0.843 (0.117)
Public	0.396 (0.206)	−0.044 (0.185)	−0.096 (0.280)	0.042 (0.389)	3.026 (0.132)	0.591 (0.117)
Non-participation (NP)	0.404 (0.079)	0.010 (0.067)	−0.228 (0.109)	0.757 (0.102)	0.297 (0.104)	1.502 (0.042)
GDP Gwth rate$\times \mathbb{1}_{\text{Gwth}\geq 0}$	−0.158 (0.112)	−0.588 (0.101)	−0.332 (0.128)	−0.047 (0.192)	−0.064 (0.160)	0.034 (0.074)
GDP Gwth rate $\times \mathbb{1}_{\text{Gwth}<0}$	0.211 (0.075)	0.201 (0.065)	0.380 (0.086)	0.170 (0.111)	0.389 (0.105)	0.046 (0.046)

Source. LFS 2002 – 2010 (authors' calculations). *Sample.* 44,033 "movers". *Note.* The reference state is unemployment.

Table 15: Intensities of quarterly transitions between labor market states, relative to unemployment (2002-2010)

Destination state → Initial state ↓	Open-ended	FTC	TAW	SE	Public	NP
Open-ended	3.722 (0.091)	0.225 (0.103)	0.218 (0.152)	0.932 (0.197)	0.360 (0.234)	0.829 (0.084)
FTC	0.892 (0.090)	1.719 (0.070)	−0.256 (0.115)	0.075 (0.206)	−0.061 (0.179)	0.292 (0.080)
TAW	0.541 (0.133)	0.219 (0.106)	1.536 (0.088)	0.065 (0.273)	0.046 (0.290)	0.175 (0.115)
Self-employed (SE)	0.822 (0.177)	0.053 (0.181)	−0.528 (0.302)	3.678 (0.140)	0.324 (0.374)	0.734 (0.126)
Public	0.662 (0.230)	0.222 (0.198)	0.324 (0.311)	0.333 (0.355)	3.153 (0.148)	0.755 (0.121)
Non-participation (NP)	0.400 (0.082)	0.054 (0.073)	−0.099 (0.111)	0.906 (0.110)	0.328 (0.111)	1.548 (0.045)
GDP Gwth rate$\times \mathbb{1}_{\text{Gwth}\geq 0.4}$	−0.070 (0.120)	−0.018 (0.095)	0.005 (0.123)	−0.284 (0.155)	0.014 (0.146)	−0.191 (0.068)
GDP Gwth rate $\times \mathbb{1}_{\text{Gwth}<0.4}$	0.134 (0.061)	−0.019 (0.053)	0.157 (0.069)	0.160 (0.095)	0.253 (0.088)	0.045 (0.037)

Source. LFS 2002 – 2010 (authors' calculations). *Sample.* 44,033 "movers". *Note.* The reference state is unemployment.

5 Average weights of the estimation sample and quarterly GDP growth rate

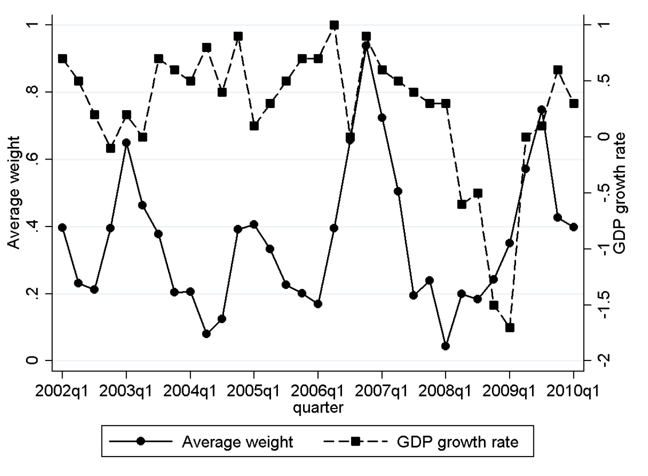

Figure 1: Quarterly GDP growth rate and average weights.

Note: For each quarter, we compute the average weight of the new sample of movers (interviewed for the first time at this quarter) as given by Equation (8).