Supplement to "Earnings inequality and dynamics in the presence of informality: The case of Brazil"

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We provide additional summary statistics in Appendix A. We present additional figures for Brazil's formal sector in Appendix B. We present additional figures for Brazil's informal sector in Appendix C. We discuss the role of multiple job holdings in Appendix D. We demonstrate the limited role of demographics in explaining the decline of the variance of residual log earnings changes in Appendix E.

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Appendix A: Additional summary statistics

Table A.1. Cross-sectional summary statistics, overall.

Year	Obs.	Mean	Std. dev.	P1	P5	P10	P25	P50	P75	P90	P95	P99	P99.9	P99.99
1985	15.7	19,852	26,915	585	1755	3121	5881	11,105	22,696	44,737	67,256	134,110	255,402	425,948
1986	16.9	20,627	26,716	635	1751	3038	5932	11,865	24,215	47,043	69,680	134,984	224,955	387,154
1987	17.6	18,824	27,220	429	1364	2496	5009	10,438	21,323	42,172	64,080	134,699	290,922	403,407
1988	18.6	18,859	27,307	291	1148	2430	4910	10,045	21,266	42,977	66,632	137,842	256,362	396,512
1989	19.3	18,591	27,174	231	935	2319	4835	9839	20,902	41,922	65,923	139,556	254,659	387,672
1990	19.7	15,268	21,970	232	962	1873	3766	8078	17,521	34,687	54,200	112,631	199,526	297,985
1991	19.5	14,533	20,786	319	1021	1915	3861	7833	16,536	32,834	51,001	104,857	192,177	315,036
1992	19.4	14,399	20,297	202	826	1804	3936	7844	16,229	33,058	50,913	101,826	189,134	277,698
1993	20.1	15,728	23,111	162	766	1899	4178	8239	17,393	36,211	56,422	117,313	217,039	324,278
1994	20.7	16,524	23,245	244	1046	2074	4260	8671	18,903	38,908	58,775	117,161	211,849	305,908
1995	21.8	19,214	27,671	502	1345	2336	4723	9921	21,786	45,038	69,210	141,114	253,044	348,350
1996	21.9	19,335	27,785	574	1457	2468	4991	10,250	21,771	44,745	68,389	141,832	262,035	373,896
1997	22.3	19,434	28,048	594	1518	2552	5099	10,342	21,726	44,565	68,732	143,569	264,084	384,921
1998	22.9	19,869	29,077	623	1581	2687	5301	10,594	22,129	44,593	69,648	148,988	282,161	412,739
1999	23.1	19,153	28,001	613	1544	2628	5230	10,257	21,224	42,486	67,007	144,740	271,705	392,265
2000	23.7	19,013	28,187	608	1516	2613	5214	10,116	20,932	42,019	66,764	146,056	276,394	393,854
2001	25.4	19,133	29,659	619	1543	2648	5268	9954	20,582	42,124	66,775	151,038	311,010	464,091
2002	26.4	18,756	30,505	623	1551	2660	5292	9708	20,055	41,195	65,011	147,759	313,361	474,376
2003	27.4	17,699	27,930	596	1527	2596	5170	9236	18,791	38,405	60,946	138,945	306,786	475,542
2004	28.8	18,017	28,201	623	1600	2730	5386	9543	19,086	39,022	61,793	140,291	305,658	486,266
2005	30.5	17,974	28,196	628	1614	2752	5533	9554	18,908	38,617	61,227	140,834	304,485	489,218
2006	32.3	18,645	29,425	664	1736	2955	5992	9892	19,412	39,774	62,802	145,559	335,661	522,767
2007	34.2	18,996	29,772	681	1781	3055	6261	10,154	19,745	40,513	63,629	147,545	339,696	530,402
2008	36.5	19,464	30,495	722	1884	3173	6445	10,413	20,210	41,296	64,882	151,420	339,068	544,611
2009	37.9	19,866	30,908	721	1864	3209	6813	10,740	20,559	42,126	66,313	154,799	333,382	551,067
2010	40.4	20,392	31,395	773	2017	3451	7150	11,161	21,166	42,969	67,674	156,655	339,306	568,684
2011	42.4	20,773	31,431	804	2081	3547	7277	11,545	21,745	43,702	68,351	156,676	333,256	582,293
2012	43.9	21,589	31,614	858	2247	3841	7886	12,290	22,813	45,472	70,051	157,155	326,983	577,155
2013	45.1	22,085	31,783	887	2326	3942	8120	12,692	23,572	46,434	71,300	158,852	328,978	587,556
2014	45.9	22,602	32,090	924	2454	4104	8313	13,143	24,181	47,504	72,443	161,116	331,021	589,361
2015	44.9	22,566	31,988	929	2509	4242	8457	13,199	23,947	47,263	72,238	160,124	336,925	588,808
2016	43.0	22,342	30,764	954	2577	4363	8665	13,312	23,864	46,388	70,941	154,707	317,613	563,472
2017	42.3	22,882	31,395	975	2660	4498	8940	13,702	24,396	47,287	72,435	158,572	317,728	571,961
2018	42.5	22,641	30,825	985	2687	4534	8889	13,566	24,124	46,854	71,716	155,823	310,005	562,571

Note: Workers aged 25–55. *Source*: RAIS, 1985–2018.

TABLE A.2. Cross-sectional summary statistics, men only.

Year	Obs.	Mean	Std. dev.	P1	P5	P10	P25	P50	P75	P90	P95	P99	P99.9	P99.99
1985	10.9	21,806	29,738	604	1810	3261	6253	12,064	24,781	49,741	75,852	147,933	276,815	452,345
1986	11.5	22,594	29,240	694	1908	3338	6467	12,983	26,291	51,689	78,045	147,480	240,500	411,612
1987	11.9	20,694	29,192	478	1483	2753	5566	11,583	23,246	46,531	72,300	147,748	279,048	407,918
1988	12.5	20,678	29,802	310	1199	2529	5287	11,099	23,169	47,432	73,964	151,087	273,212	414,375
1989	12.9	20,447	29,666	242	954	2390	5206	10,947	22,825	46,691	73,473	152,709	269,575	397,090
1990	13.0	16,529	23,716	246	1002	1951	4039	8869	18,787	37,744	59,386	121,774	210,552	315,132
1991	12.9	15,800	22,601	335	1052	1983	4109	8597	17,775	35,778	56,068	114,615	202,884	340,364
1992	12.7	15,789	22,315	208	821	1794	4111	8613	17,770	36,652	56,589	112,009	200,857	298,910
1993	13.1	17,225	25,278	166	747	1851	4356	9037	18,915	40,227	62,608	128,325	231,322	349,415
1994	13.4	17,821	25,239	248	1050	2098	4470	9391	20,162	41,854	64,054	128,022	225,410	324,779
1995	14.0	20,857	29,942	524	1399	2442	5045	10,859	23,422	48,993	75,825	153,967	265,982	369,637
1996	13.9	20,897	30,184	599	1512	2569	5301	11,112	23,125	48,491	75,210	154,839	276,879	392,875
1997	14.1	20,874	30,399	612	1533	2617	5362	11,132	22,875	47,940	75,304	156,928	279,669	402,947
1998	14.4	21,114	31,347	638	1590	2702	5548	11,307	22,916	47,183	75,734	162,362	298,428	432,973
1999	14.3	20,281	30,187	628	1539	2616	5420	10,891	21,868	44,684	72,806	157,247	288,153	413,110
2000	14.7	19,991	30,046	628	1523	2615	5381	10,710	21,554	43,731	71,470	157,184	291,335	409,962
2001	15.7	20,302	32,017	629	1558	2671	5468	10,556	21,361	44,346	72,585	163,447	333,319	482,633
2002	16.2	19,775	33,302	654	1575	2676	5469	10,316	20,718	42,822	69,725	159,904	335,594	493,453
2003	16.7	18,711	30,140	628	1545	2606	5349	9876	19,464	40,006	65,655	151,336	331,293	499,499
2004	17.5	19,079	30,457	663	1624	2768	5575	10,110	19,842	40,676	66,423	153,033	331,317	511,021
2005	18.4	19,048	30,436	668	1671	2825	5721	10,205	19,709	40,218	65,629	153,618	328,746	518,375
2006	19.4	19,689	31,636	712	1803	3042	6162	10,627	20,176	41,152	66,822	157,486	358,328	558,436
2007	20.5	20,062	31,930	740	1883	3167	6441	10,916	20,527	41,898	67,361	159,765	357,695	568,516
2008	21.8	20,638	32,709	804	2031	3363	6695	11,283	21,149	42,798	68,702	165,123	359,067	584,843
2009	22.4	21,001	33,154	785	2000	3371	6938	11,570	21,433	43,537	70,143	168,102	355,285	596,351
2010	23.7	21,662	33,744	867	2218	3657	7362	12,105	22,174	44,496	71,921	169,397	362,153	618,336
2011	24.7	22,178	33,898	902	2317	3825	7579	12,608	22,949	45,473	72,672	169,992	357,621	623,517
2012	25.3	23,064	34,277	973	2503	4154	8219	13,442	24,119	47,239	74,429	171,979	355,940	633,150
2013	25.8	23,691	34,468	999	2582	4257	8435	14,033	24,991	48,562	75,997	173,752	359,881	642,189
2014	26.0	24,235	34,812	1042	2652	4420	8709	14,489	25,652	49,641	77,273	176,476	362,136	646,920
2015	25.3	24,077	34,642	1014	2641	4452	8773	14,463	25,291	49,160	76,822	175,220	364,824	643,974
2016	24.1	23,693	33,301	1021	2679	4478	8929	14,448	25,000	48,133	75,243	168,912	344,804	623,699
2017	23.6	24,233	33,968	1037	2743	4595	9190	14,788	25,503	49,042	76,947	172,357	346,970	631,279
2018	23.7	23,919	33,340	1053	2763	4650	9190	14,606	25,136	48,419	75,901	168,979	340,037	615,497

Note: Workers aged 25–55. *Source*: RAIS, 1985–2018.

TABLE A.3. Cross-sectional summary statistics, women only.

Year	Obs.	Mean	Std. dev.	P1	P5	P10	P25	P50	P75	P90	P95	P99	P99.9	P99.99
1985	4.8	15,463	18,364	533	1661	2857	5378	9299	18,347	35,186	49,613	89,725	162,360	292,297
1986	5.4	16,417	19,630	546	1503	2547	5203	9744	19,903	38,414	53,682	95,500	170,577	266,223
1987	5.7	14,943	22,087	356	1142	2103	4320	8419	17,244	34,083	48,978	95,853	349,114	390,751
1988	6.1	15,117	20,772	257	1049	2228	4415	8304	17,418	34,025	51,686	107,098	189,608	326,275
1989	6.4	14,846	20,777	211	896	2203	4411	8027	17,087	33,021	49,989	106,495	194,909	343,763
1990	6.7	12,811	17,837	208	896	1740	3422	6714	15,037	29,584	43,748	90,607	166,149	246,986
1991	6.7	12,095	16,477	295	961	1792	3534	6540	14,030	27,533	41,404	82,045	155,255	233,028
1992	6.6	11,734	15,371	193	841	1825	3708	6617	13,605	26,583	39,789	75,928	143,422	217,458
1993	7.0	12,953	18,102	157	794	1976	3984	7028	14,575	28,827	44,341	92,373	170,239	253,249
1994	7.4	14,173	18,880	240	1042	2036	3981	7491	16,652	33,813	49,774	93,499	168,105	249,112
1995	7.9	16,297	22,808	473	1269	2166	4330	8455	18,752	38,458	57,993	112,305	214,995	300,946
1996	8.0	16,631	22,796	545	1378	2313	4630	8977	19,368	38,579	57,574	111,614	221,920	322,283
1997	8.2	16,970	23,283	566	1457	2458	4757	9182	19,679	39,252	58,677	115,559	222,966	331,703
1998	8.5	17,766	24,633	596	1557	2660	5012	9538	20,624	40,835	60,858	123,556	238,938	355,660
1999	8.7	17,303	23,873	594	1545	2648	5003	9341	19,935	39,492	58,859	120,402	232,289	338,864
2000	9.0	17,418	24,775	584	1503	2611	4967	9221	19,764	39,607	59,878	124,658	244,296	349,034
2001	9.7	17,251	25,295	579	1506	2606	5041	9014	19,182	39,091	58,914	125,432	266,031	397,658
2002	10.2	17,137	25,356	581	1520	2644	5069	8893	18,854	38,998	58,563	124,371	270,983	412,300
2003	10.7	16,118	23,989	560	1491	2576	5029	8458	17,511	36,165	54,682	116,725	261,294	415,282
2004	11.3	16,373	24,203	582	1552	2667	5197	8645	17,716	36,739	55,557	118,862	257,566	410,678
2005	12.1	16,334	24,289	580	1536	2648	5317	8604	17,408	36,366	55,475	119,903	261,916	399,578
2006	12.9	17,070	25,649	611	1641	2858	5822	8931	18,032	37,930	57,489	124,361	289,308	430,627
2007	13.7	17,407	26,145	624	1658	2873	6140	9150	18,300	38,647	58,693	127,225	294,307	428,367
2008	14.8	17,732	26,805	644	1698	2913	6257	9323	18,521	39,294	59,754	130,521	302,464	446,000
2009	15.5	18,222	27,248	655	1729	2981	6719	9675	19,014	40,297	61,288	134,710	300,453	443,299
2010	16.6	18,580	27,601	690	1805	3097	6955	9981	19,272	40,845	62,223	136,126	303,894	449,789
2011	17.7	18,812	27,503	715	1856	3186	7076	10,270	19,620	41,436	62,755	135,569	298,549	461,458
2012	18.6	19,580	27,449	768	2010	3456	7675	10,907	20,624	43,193	64,598	136,492	290,728	439,453
2013	19.3	19,942	27,655	788	2089	3580	7824	11,273	21,049	43,780	65,591	137,725	290,507	451,093
2014	19.8	20,460	27,979	825	2190	3761	7996	11,718	21,772	44,812	66,901	139,581	290,801	456,351
2015	19.6	20,616	28,076	843	2318	4004	8141	11,855	21,794	44,813	66,863	139,654	298,356	465,040
2016	18.9	20,621	27,094	886	2455	4221	8442	12,094	22,078	44,399	65,828	135,633	281,736	447,726
2017	18.7	21,179	27,723	912	2541	4386	8772	12,532	22,613	45,282	67,255	139,690	280,049	459,173
2018	18.9	21,038	27,260	923	2544	4376	8684	12,472	22,497	45,130	66,793	137,607	274,721	447,120

Note: Workers aged 25–55. *Source*: RAIS, 1985–2018.

Appendix B: Additional figures for Brazil's formal sector

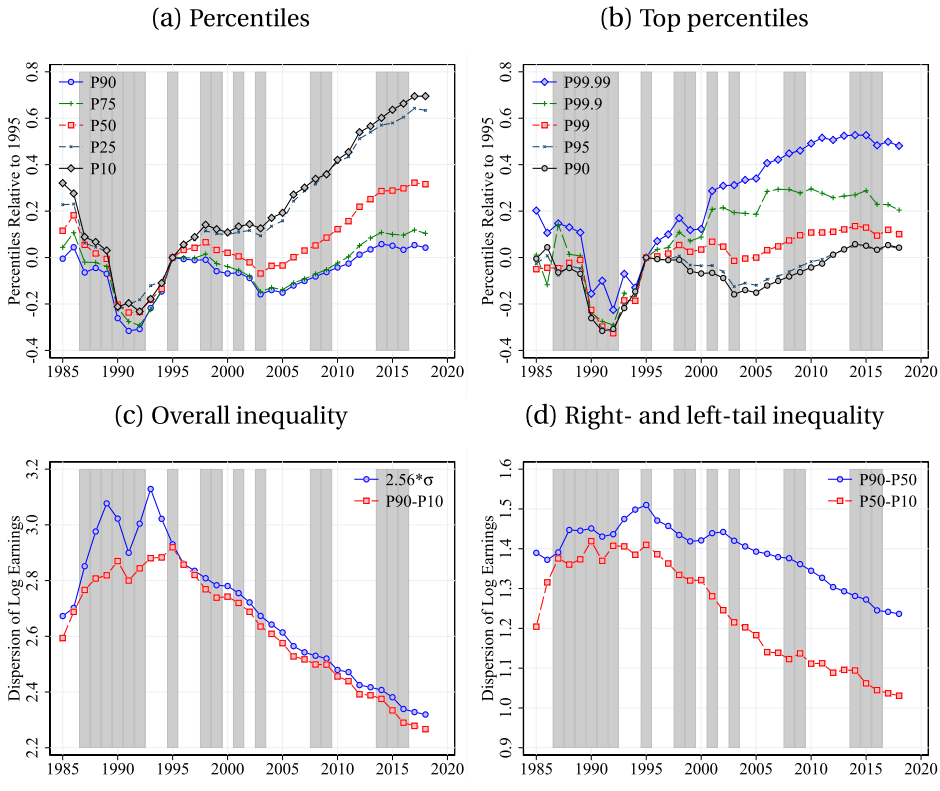


Figure B.1. Evolution of earnings percentiles, men and women pooled. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

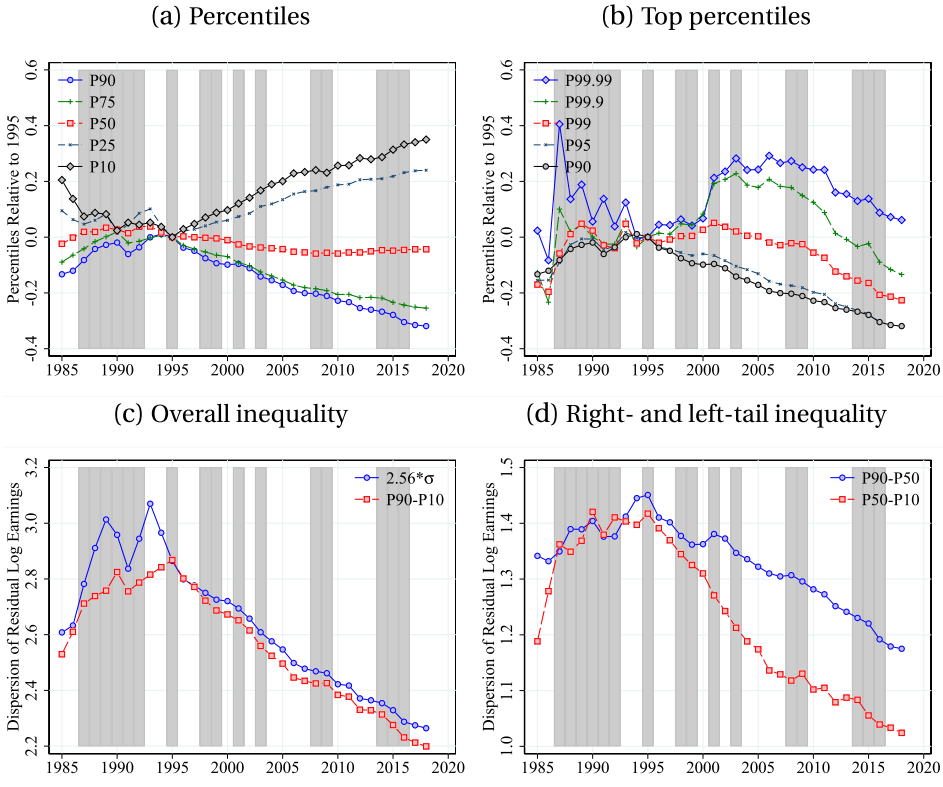


FIGURE B.2. Evolution of earnings percentiles, men and women pooled and controlling for age. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

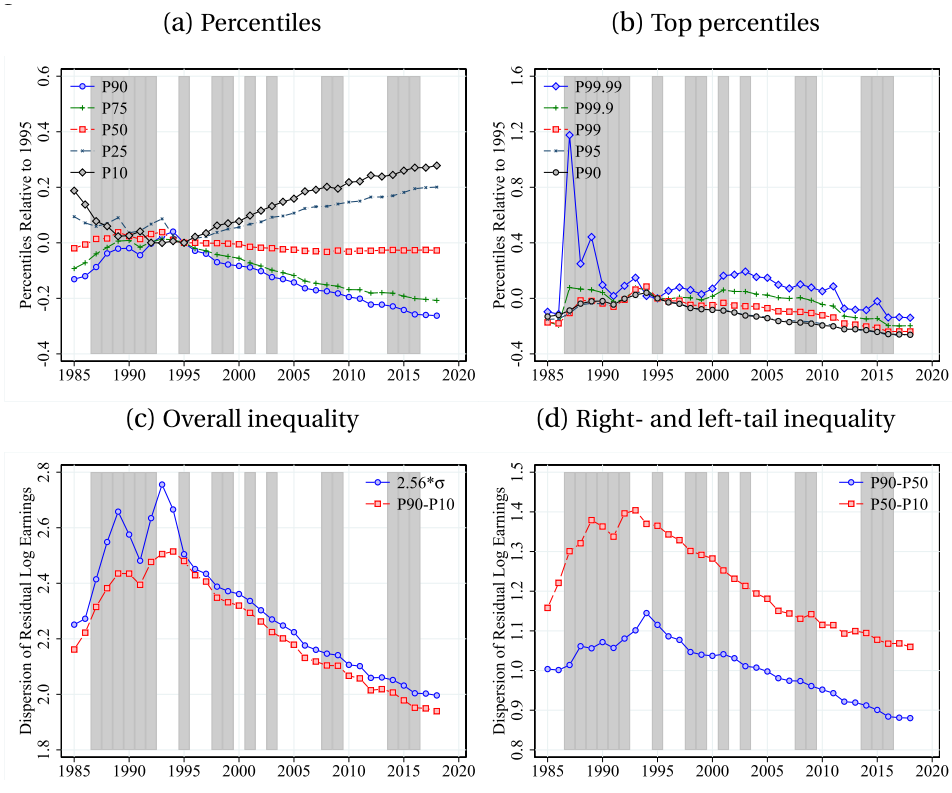


FIGURE B.3. Evolution of residual earnings percentiles, men and women pooled and controlling for age and education. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

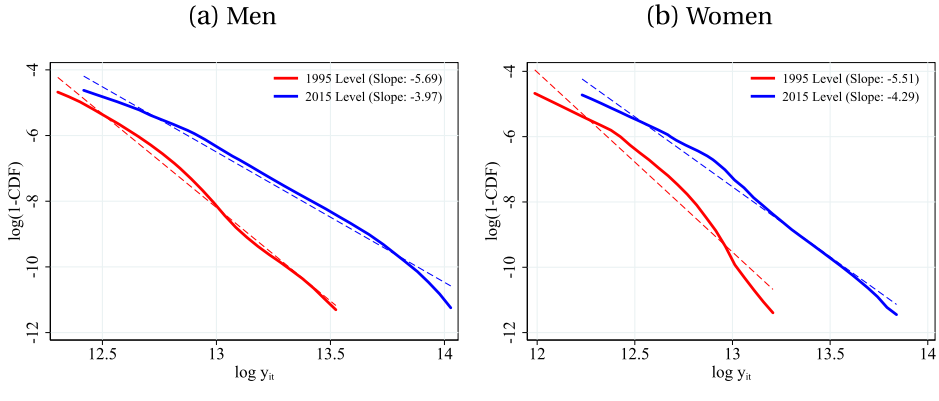


FIGURE B.4. Pareto tail within top 1%, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

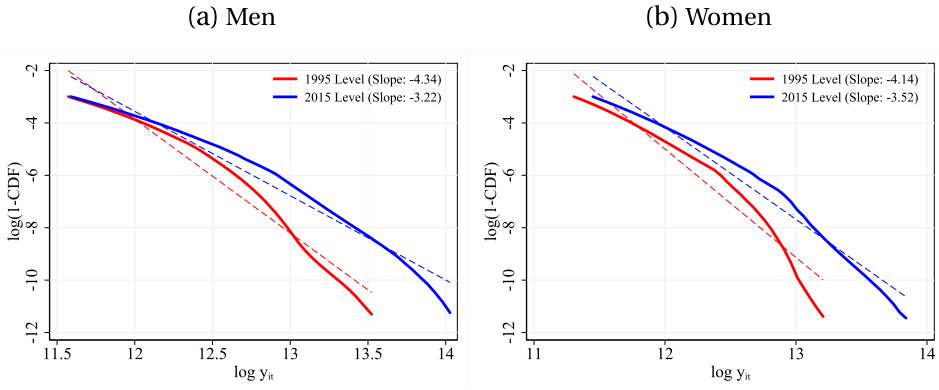


FIGURE B.5. Pareto tail within top 5%, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

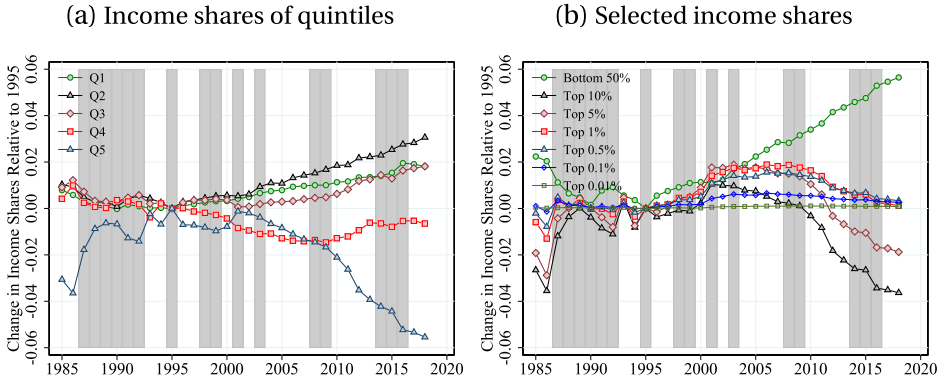


FIGURE B.6. Evolution of earnings shares, relative to 1995. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

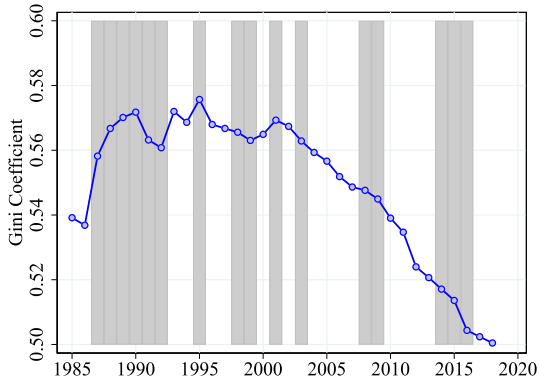


FIGURE B.7. Gini coefficient of earnings. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

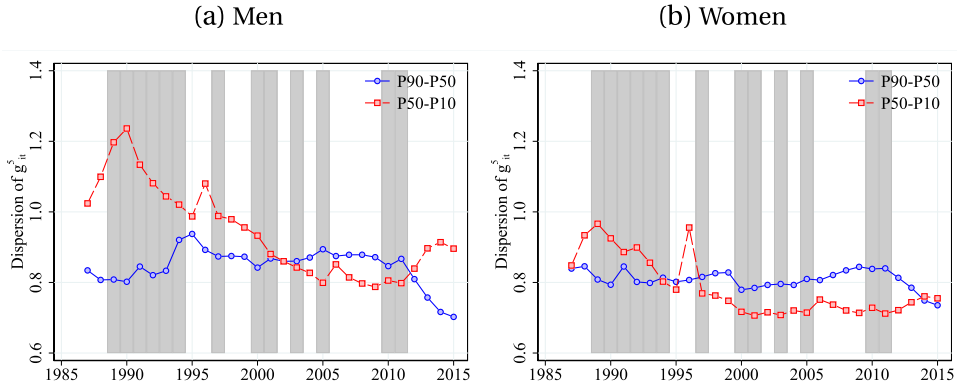


FIGURE B.8. Dispersion in 5-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

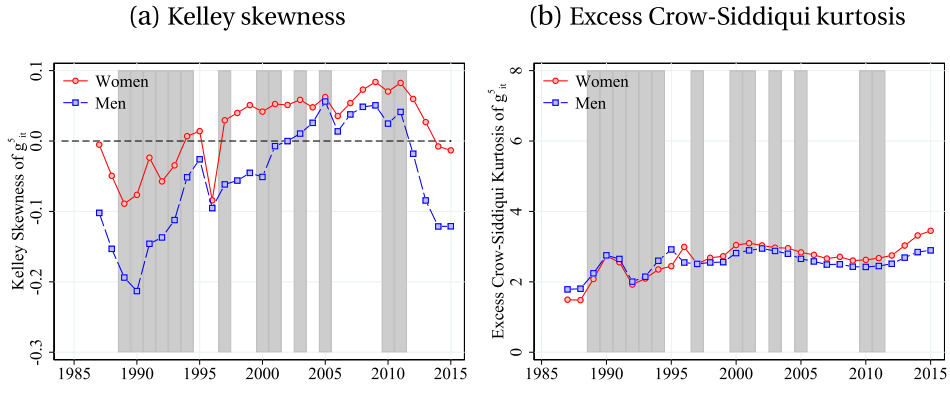


FIGURE B.9. Higher-order moments of the distribution of 5-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

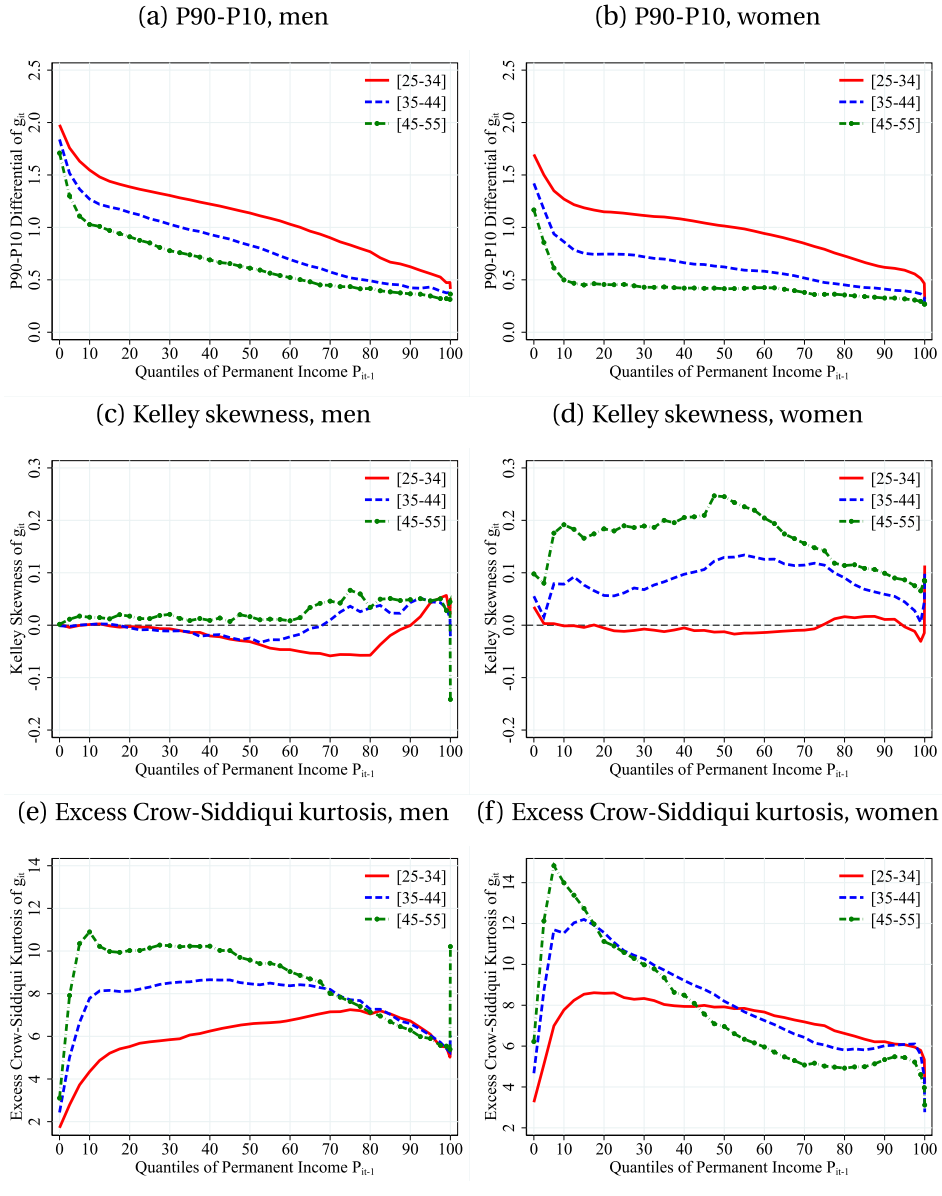


FIGURE B.10. Moments of the distribution of 5-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1999–2018.

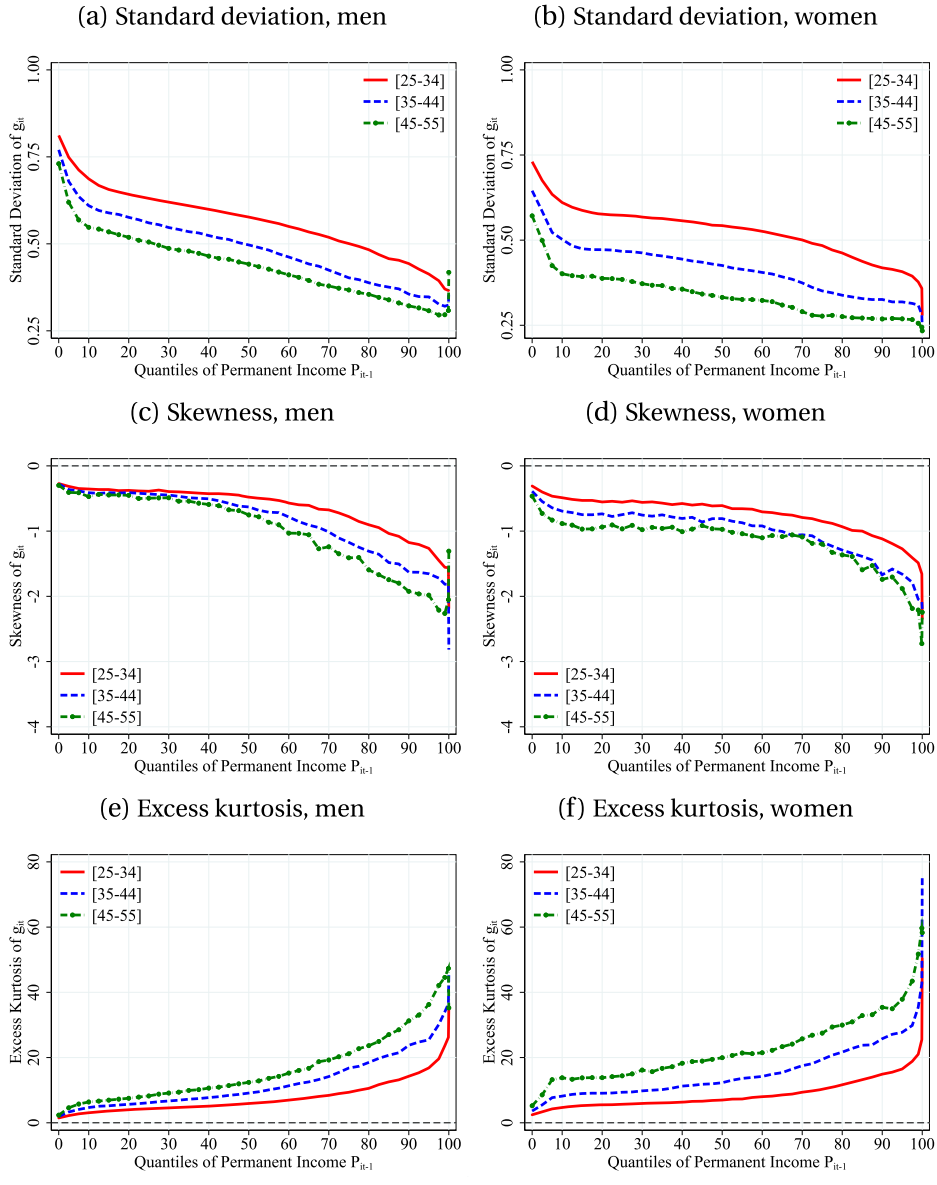


FIGURE B.11. Standardized moments of the distribution of 1-year earnings changes, by gender. *Note*: Workers aged 25–55. Skewness corresponds to the standardized third moment of the distribution. Excess kurtosis is defined as the standardized fourth moment of the distribution minus 3. *Source*: RAIS, 1999–2018.

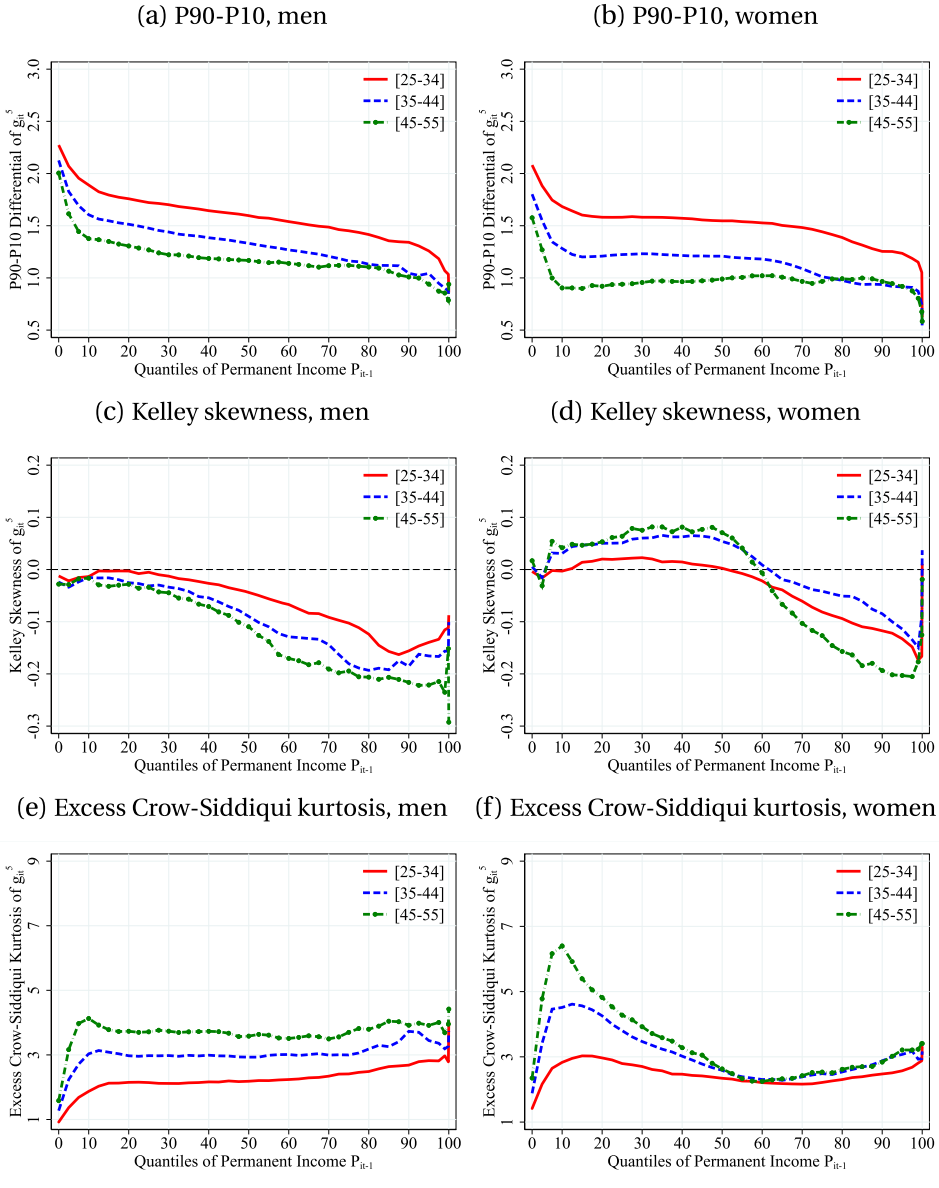


FIGURE B.12. Moments of the distribution of 5-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1999–2018.

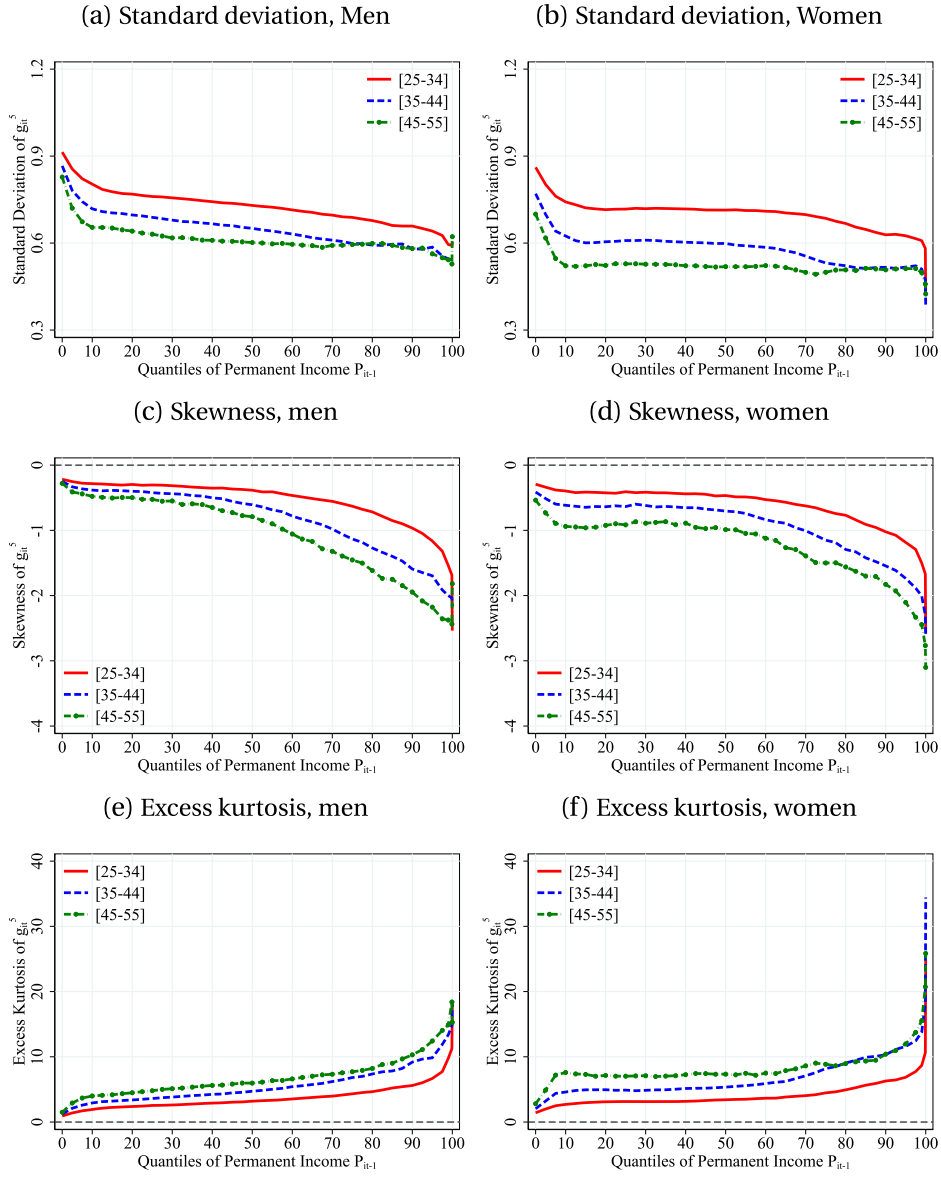


FIGURE B.13. Standardized moments of the distribution of 5-year earnings changes, by gender. *Note*: Workers aged 25–55. Skewness corresponds to the standardized third moment of the distribution. Excess kurtosis is defined as the standardized fourth moment of the distribution minus 3. *Source*: RAIS, 1999–2018.

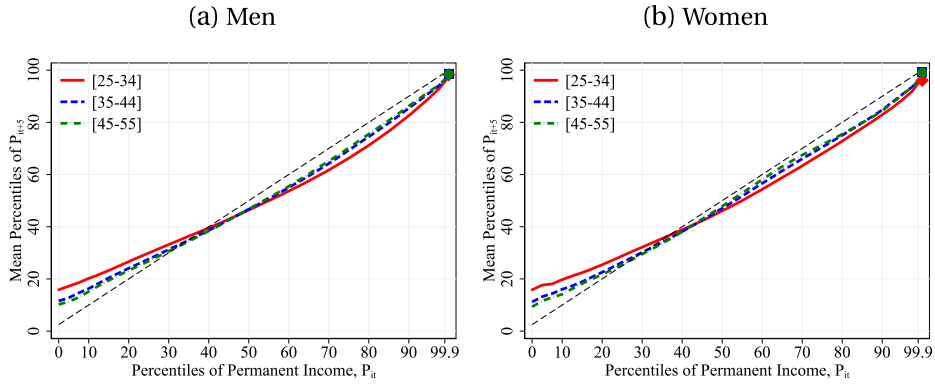


FIGURE B.14. Evolution of earnings mobility over the life cycle, by gender. *Note*: Workers aged 25–55. Colored markers denote the top 0.1% of permanent income P_{it}. *Source*: RAIS, 1985–2018.

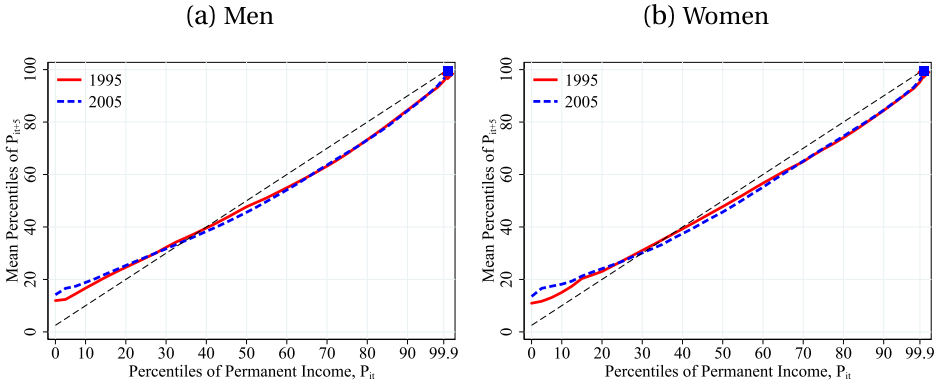


FIGURE B.15. Evolution of earnings mobility over time, by gender. *Note*: Workers aged 25–55. Colored markers denote the top 0.1% of permanent income P_{it}. *Source*: RAIS, 1985–2018.

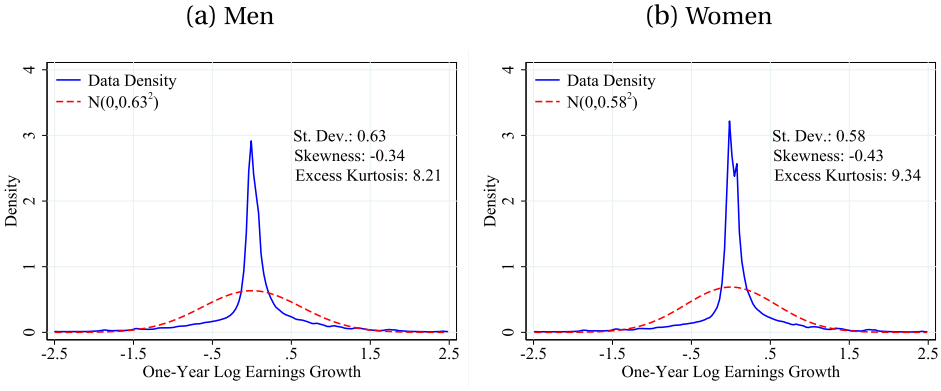


FIGURE B.16. Density of 1-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

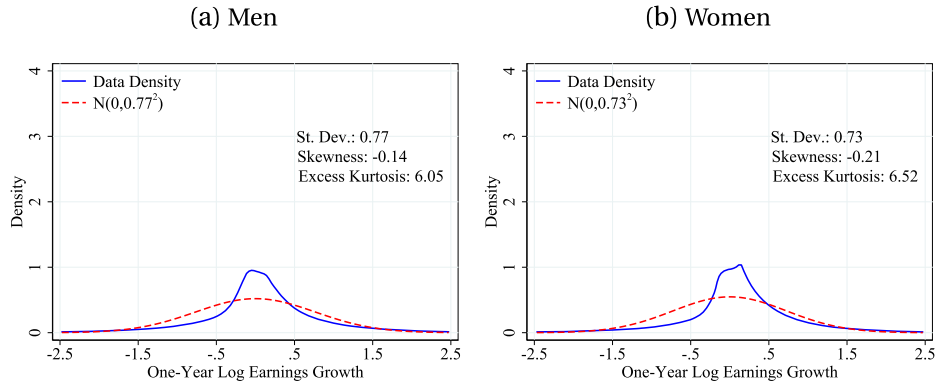


FIGURE B.17. Density of 5-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

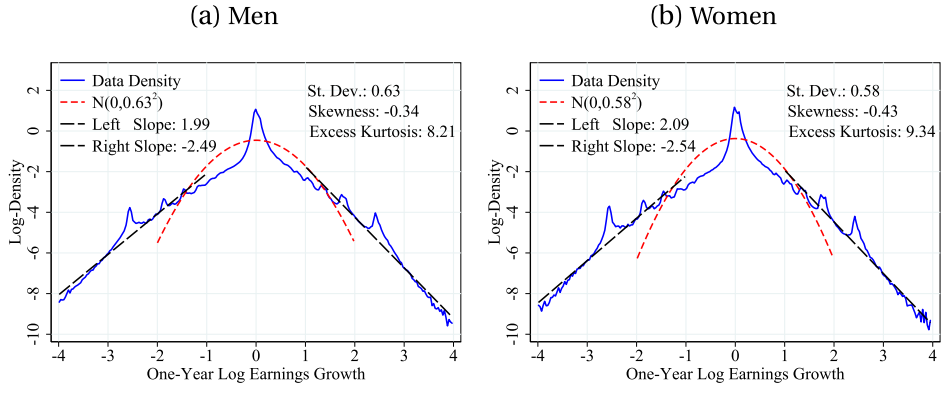


FIGURE B.18. Log density of 1-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

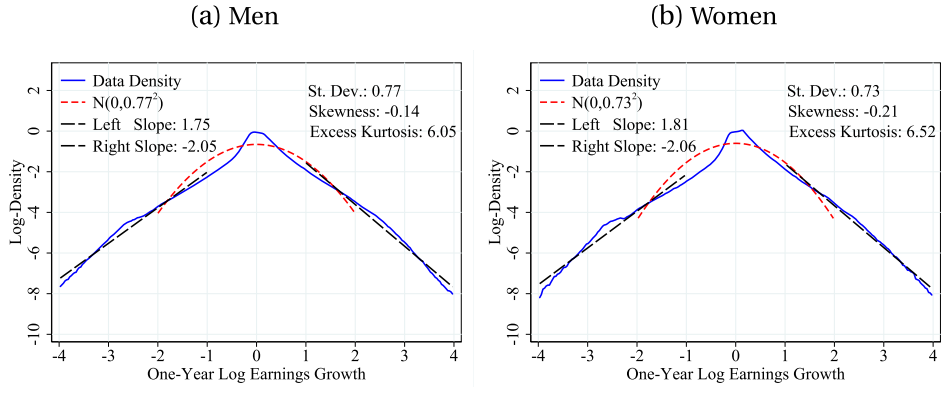


FIGURE B.19. Log density of 5-year earnings changes, by gender. *Note*: Workers aged 25–55. *Source*: RAIS, 1985–2018.

Appendix C: Additional figures for Brazil's informal sector

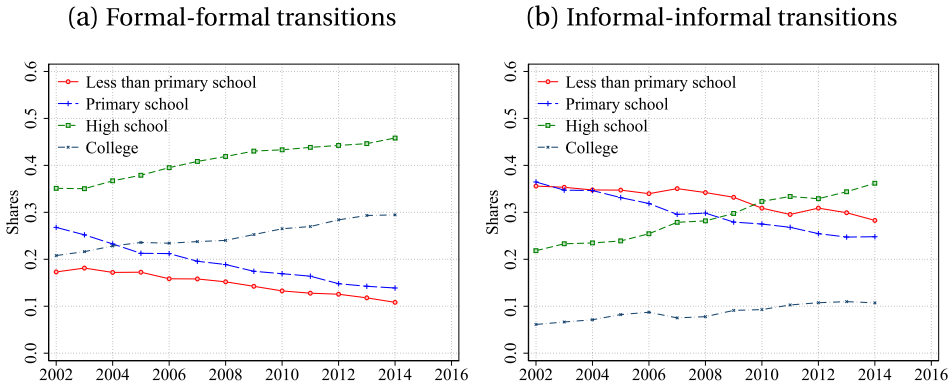


Figure C.1. Education shares, by origin and destination sector. *Note*: Workers aged 25–55. *Source*: PME, 2002–2015.

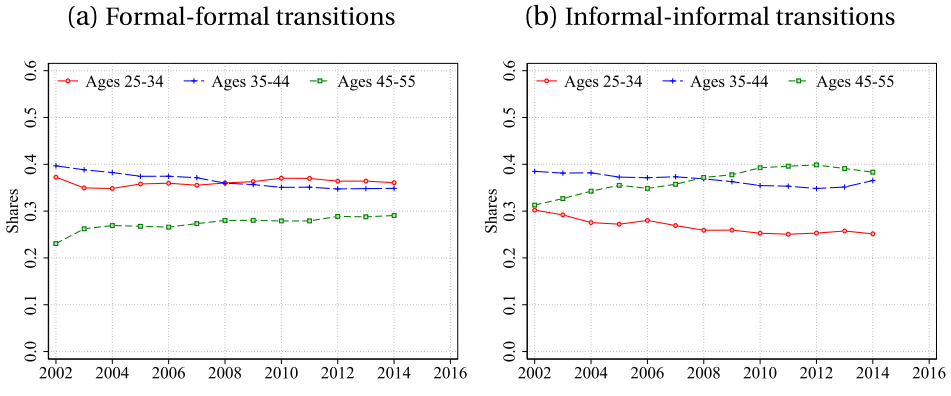


Figure C.2. Age group shares, by origin and destination sector. *Note*: Workers aged 25–55. *Source*: PME, 2002–2015.

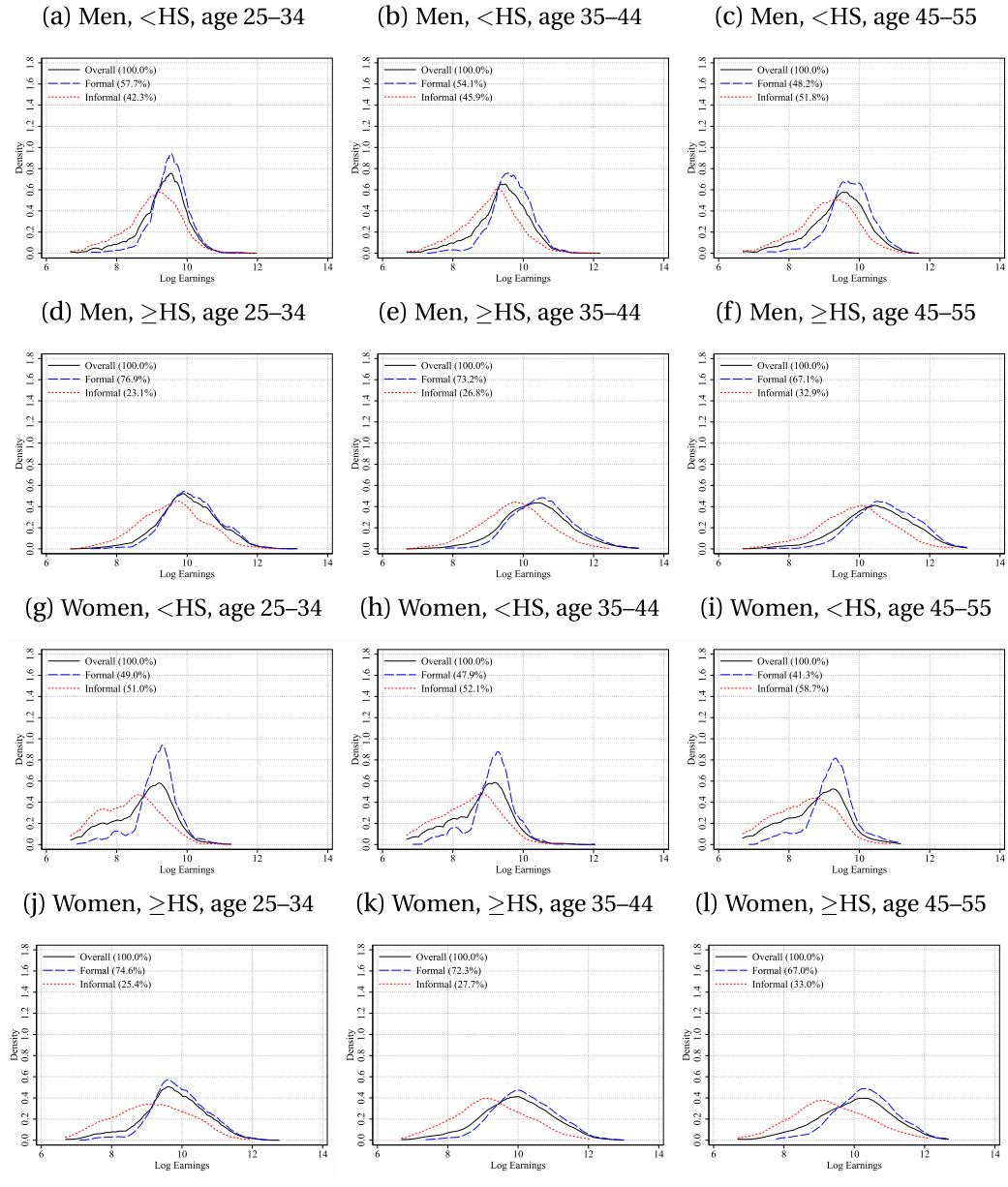
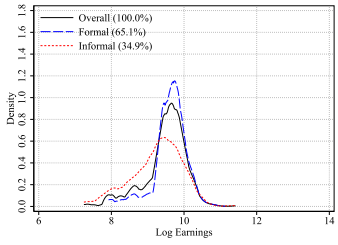
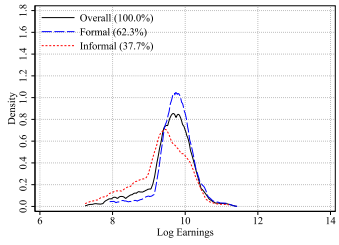


FIGURE C.3. Densities of log earnings, by sector and population subgroup in 2002. *Note*: Workers aged 25–55. Kernel densities of log earnings by worker group. Different lines show the overall distribution as well as that in the formal sector and that in the informal sector. *Source*: PME, 2002.

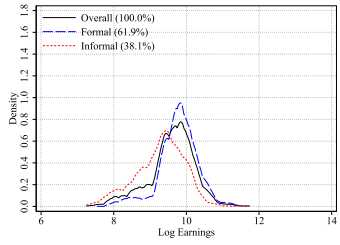
(a) Men, <HS, age 25–34



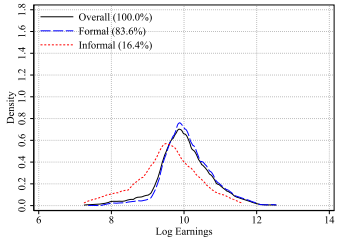
(b) Men, <HS, age 35–44



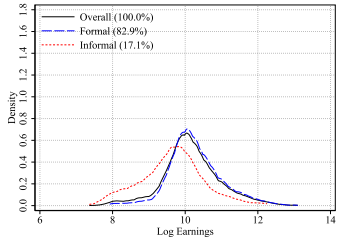
(c) Men, <HS, age 45–55



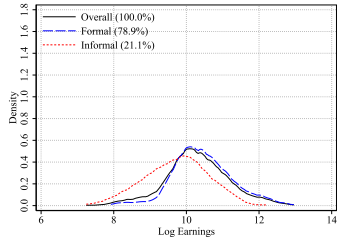
(d) Men, ≥HS, age 25–34



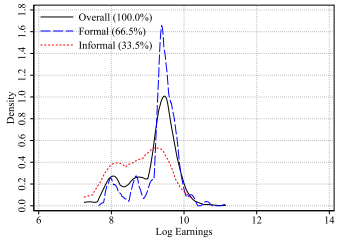
(e) Men, ≥HS, age 35–44



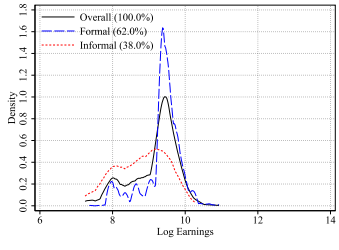
(f) Men, ≥HS, age 45–55



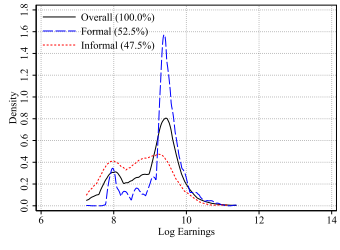
(g) Women, <HS, age 25–34



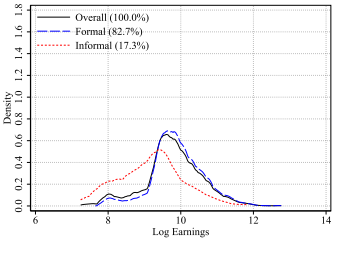
(h) Women, <HS, age 35–44



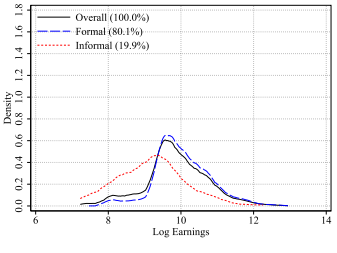
(i) Women, <HS, age 45–55



(j) Women, ≥HS, age 25–34



(k) Women, ≥HS, age 35–44



(l) Women, ≥HS, age 45–55

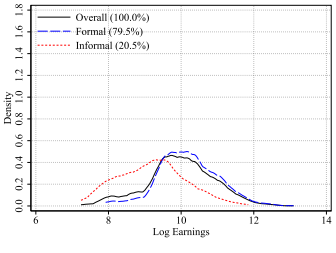


FIGURE C.4. Densities of log earnings, by sector and population subgroup in 2015. *Note*: Workers aged 25–55. Kernel densities of log earnings by worker group. Different lines show the overall distribution as well as that in the formal sector and that in the informal sector. *Source*: PME, 2015.

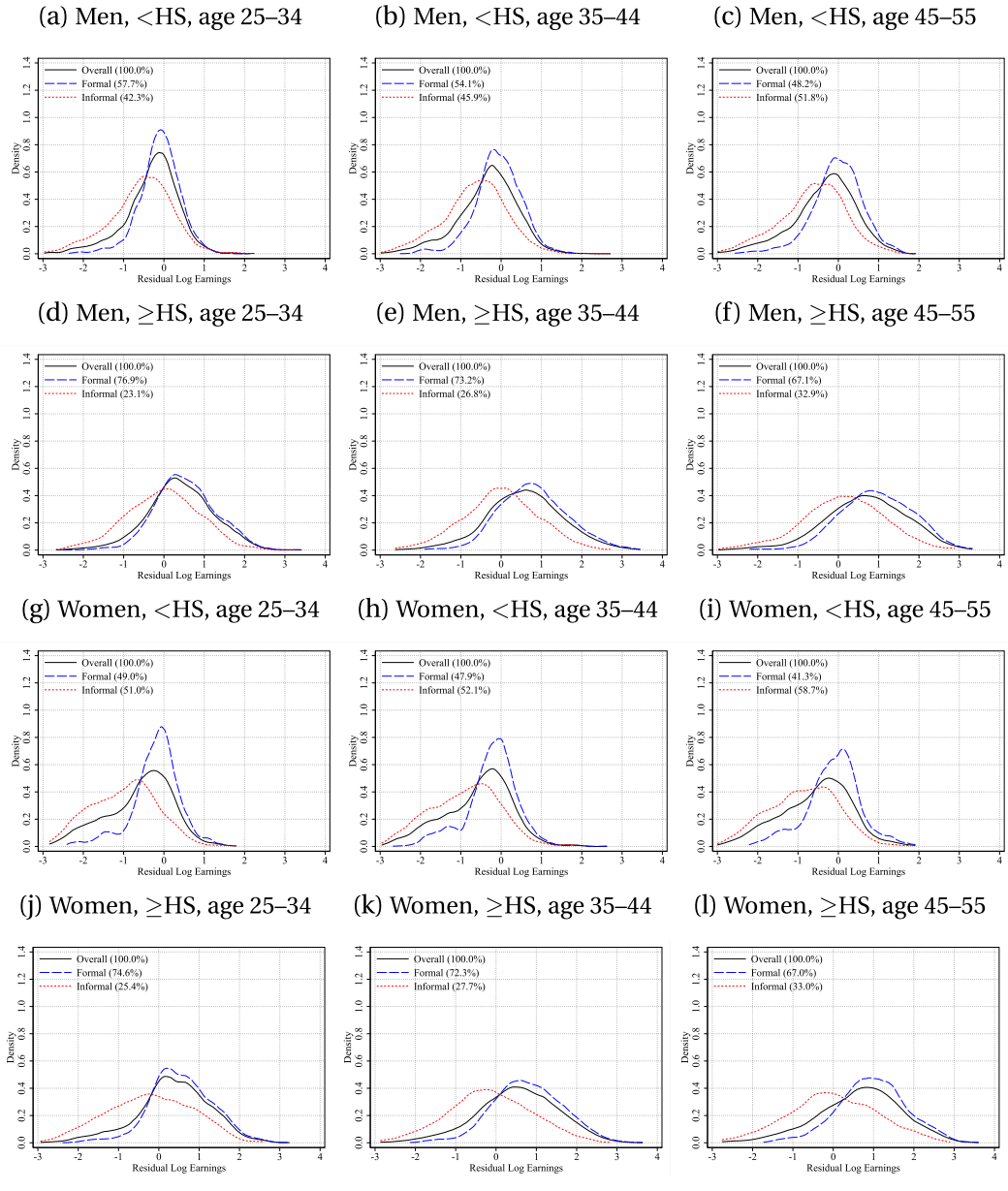


FIGURE C.5. Densities of residual log earnings, by sector and population subgroup in 2002. *Note*: Workers aged 25–55. Kernel densities of residual log earnings by worker group. Residuals are calculated controlling for age and survey wave fixed effects, separately by gender and year. Different lines show the overall distribution as well as that in the formal sector and that in the informal sector. *Source*: PME, 2002.

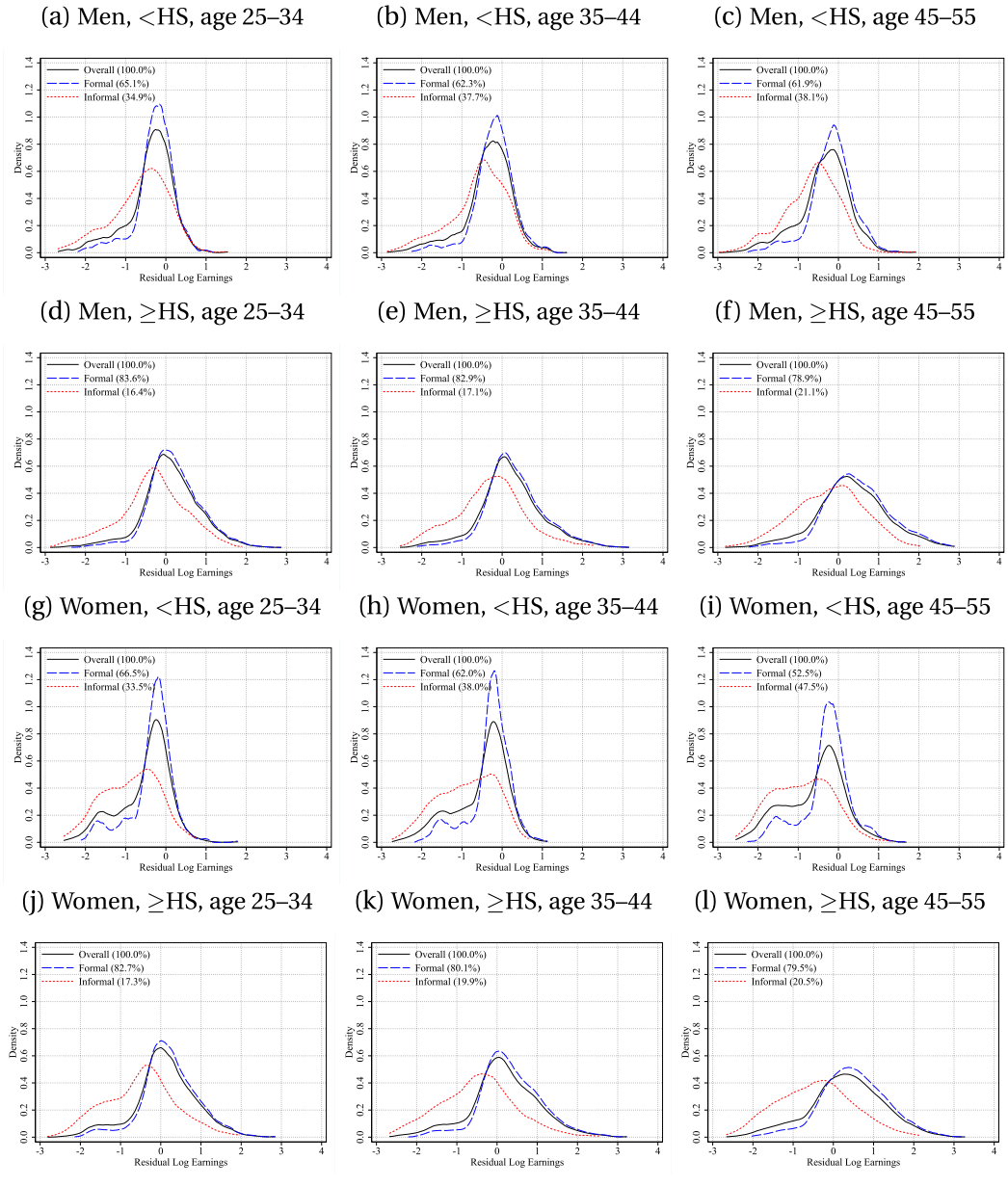


FIGURE C.6. Densities of residual log earnings, by sector and population subgroup in 2015. *Note*: Workers aged 25–55. Kernel densities of residual log earnings by worker group. Residuals are calculated controlling for age and survey wave fixed effects, separately by gender and year. Different lines show the overall distribution as well as that in the formal sector and that in the informal sector. *Source*: PME, 2015.

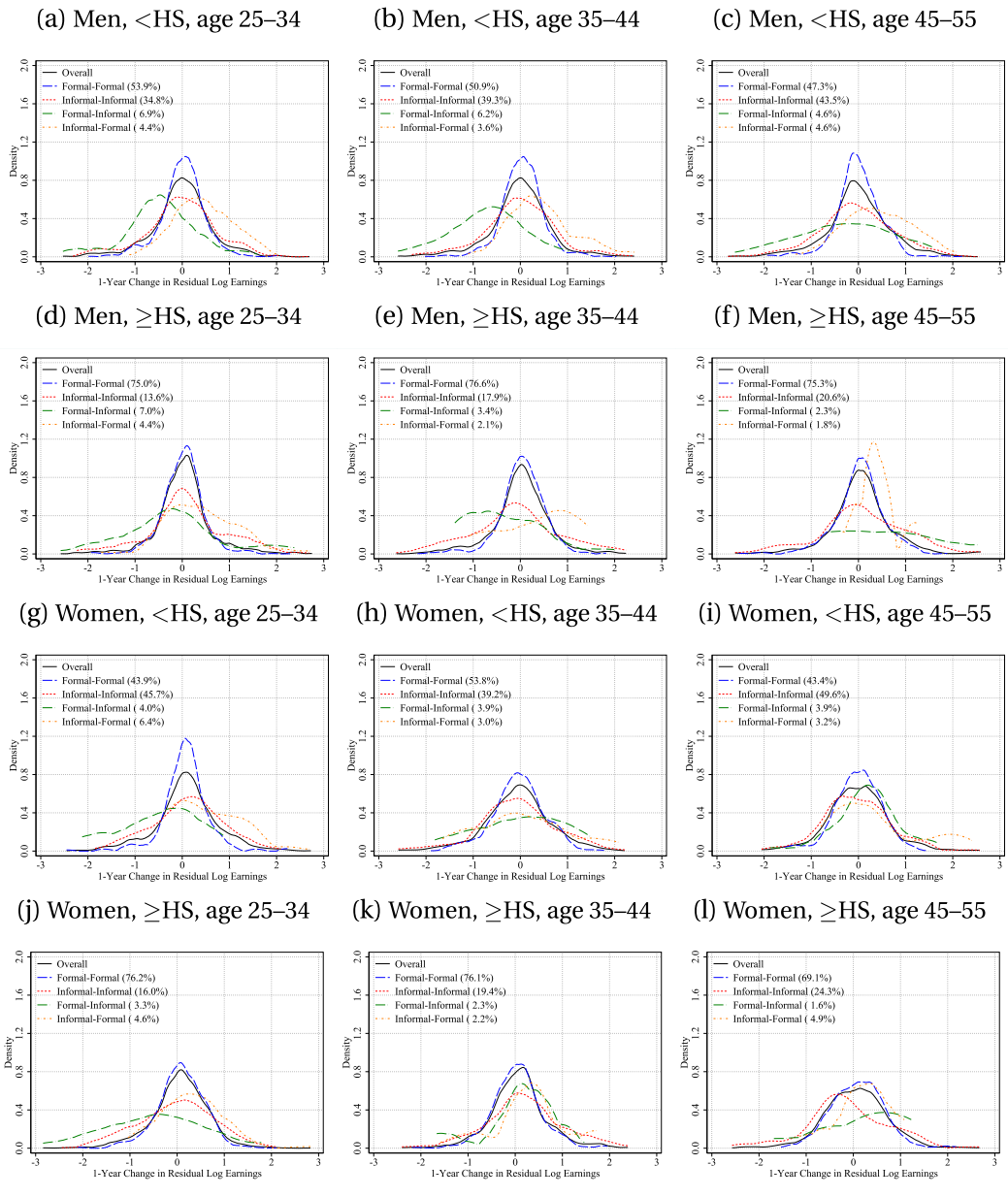
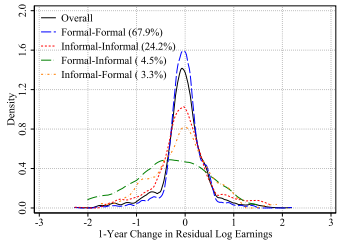
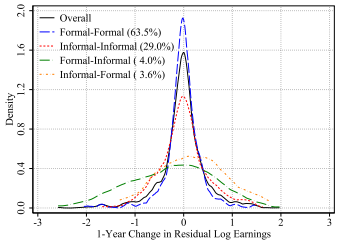


FIGURE C.7. Densities of 1-year residual log earnings changes, by transition type and population subgroup in 2002–2003. *Note*: This figure shows kernel densities of 1-year changes in residual log earnings for workers aged 25–55 by worker group. Residuals are calculated controlling for age and survey wave fixed effects, separately by gender and year. Different lines denote different combinations of a worker's current sector of employment and that in the next survey wave (e.g., "Formal-Informal" denotes current employment in the formal sector and employment in the informal sector in the next survey wave). *Source*: PME, 2002–2003.

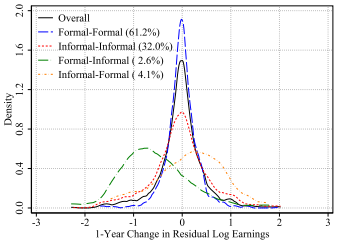
(a) Men, <HS, age 25–34



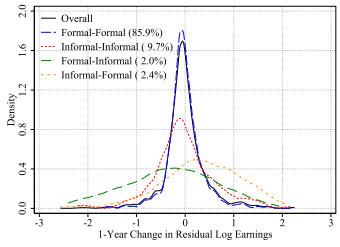
(b) Men, <HS, age 35–44



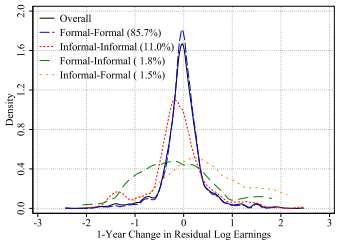
(c) Men, <HS, age 45–55



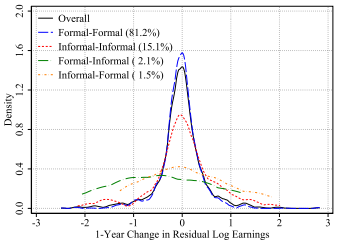
(d) Men, ≥HS, age 25–34



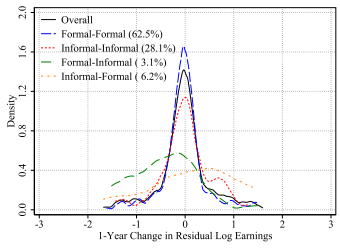
(e) Men, ≥HS, age 35–44



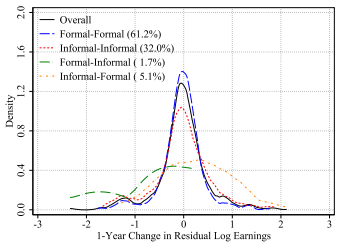
(f) Men, ≥HS, age 45–55



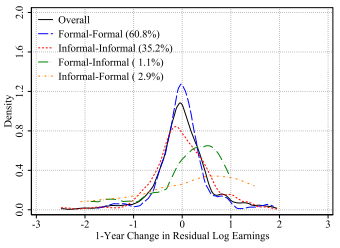
(g) Women, <HS, age 25–34



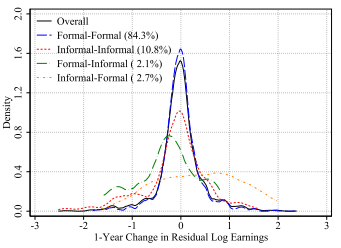
(h) Women, <HS, age 35–44



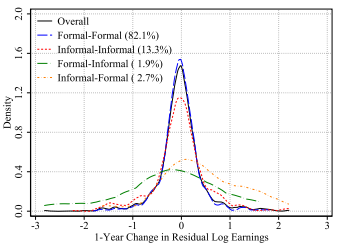
(i) Women, <HS, age 45–55



(j) Women, ≥HS, age 25–34



(k) Women, ≥HS, age 35–44



(l) Women, ≥HS, age 45–55

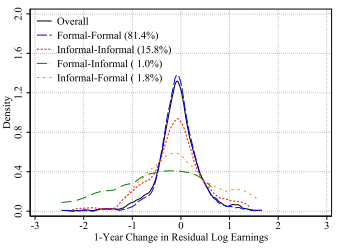


FIGURE C.8. Densities of 1-year residual log earnings changes, by transition type and population subgroup in 2014–2015. *Note*: This figure shows kernel densities of 1-year changes in residual log earnings for workers aged 25–55 by worker group. Residuals are calculated controlling for age and survey wave fixed effects, separately by gender and year. Different lines denote different combinations of a worker's current sector of employment and that in the next survey wave (e.g., "Formal-Informal" denotes current employment in the formal sector and employment in the informal sector in the next survey wave). *Source*: PME, 2014–2015.

TABLE D.1. Evolution of multiple-job-holding rates.

	Panel A. Formal sector				*Panel B. Informal sector*			
	2002–04	2005–08	2009–11	2012–15	2002–04	2005–08	2009–11	2012–15
Share with secondary job (%)	2.8	2.9	2.7	2.3	2.1	2.3	2.1	2.2
Mean weekly hours in main job	42.8	42.5	42.3	42.0	41.8	41.6	41.0	40.3
Mean weekly hours in secondary jobs	17.5	17.2	15.0	16.7	22.2	21.8	20.2	21.6
Share with SS contributions in secondary job	51.2	52.2	54.4	59.1	25.0	23.5	25.7	30.9

Note: Workers aged 25–55. Share of formal or informal employment with a secondary job. "Mean weekly hours in main job" is for the full sample population conditional on holding a job. "Mean weekly hours in secondary jobs" includes hours worked in all nonprimary (i.e., secondary, tertiary, etc.) jobs and is computed among the subpopulation of workers with more than one concurrent job. *Source*: PME, 2002–2015.

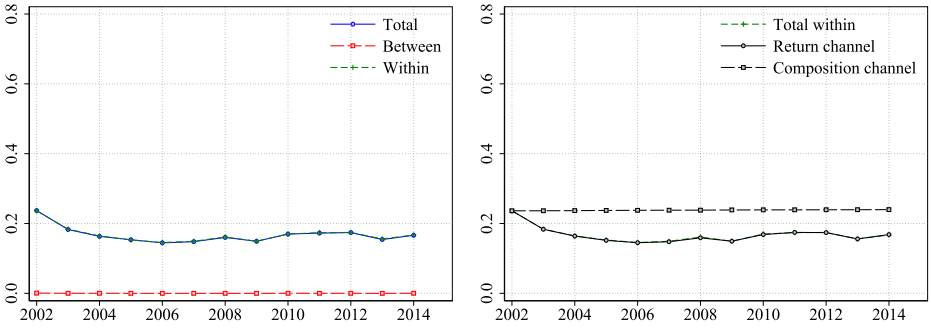
APPENDIX D: THE ROLE OF MULTIPLE JOB HOLDINGS

One may wonder whether the decrease in the informal employment share in Brazil is driven by changes in the prevalence of workers concurrently holding multiple jobs with a mix between formal and informal employment. To investigate this, Table D.1 summarizes the share of workers who hold multiple jobs in a month, broken down by whether the main job is in the formal sector (panel A) or informal sector (panel B). Holding multiple job is not particularly common in Brazil, with roughly 2% of employed workers holding multiple jobs. The fraction is modestly lower among informal sector workers. Among formal sector workers with a second job, roughly half of them contribute to social security in their second job (a proxy for the formality status of the second job). Moreover, the (un)importance of holding multiple jobs has remained roughly stable over time. Hence, the main margin of formalization is the extensive margin—workers switching entirely into the formal sector—as opposed to a declining prevalence of workers holding multiple jobs in both the informal and formal sector.

APPENDIX E: THE LIMITED ROLE OF DEMOGRAPHICS IN EXPLAINING THE DECLINE IN THE VARIANCE OF RESIDUAL LOG EARNINGS CHANGES

We here present a between- versus within-group decomposition similar to that in equation (4) of Section 4.1.4 of the main text (Engbom, Gonzaga, Moser, and Olivieri (2022)). Specifically, we decompose the overall variance of earnings changes for workers undergoing formal-formal and informal-informal sector transitions into between and within components by worker subgroups. Specifically, we focus on worker subgroups by four education groups. We restrict attention to the formal-formal and informal-informal worker groups because they constitute the great majority of Brazilian employment. Motivated by the fact that the within-education group component accounts for the great majority of changes in the volatility of earnings among formal-formal and informal-informal workers, we further consider a shift-share analysis of the within-education

(a) Between vs. within, formal-formal (b) Within component, formal-formal



(c) Between vs. within, informal-informal (d) Within component, informal-informal

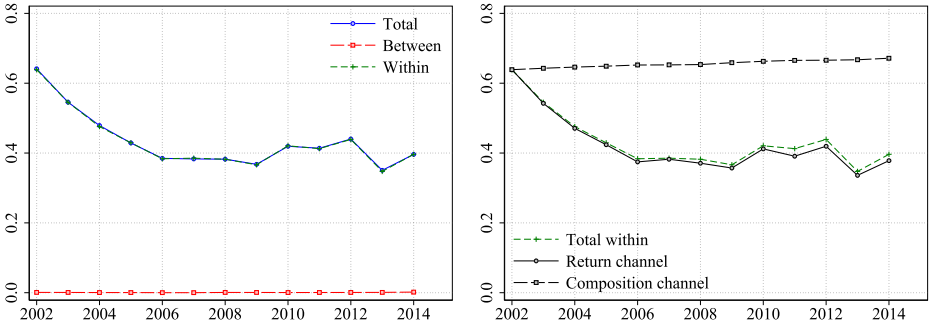


FIGURE E.1. The role of changes in educational attainment. *Note*: Workers aged 25–55. Panels A and C show a between/within decomposition of the variance of earnings changes within the formal-formal (panel A) and informal-informal (panel C) worker groups based on equation (4) across four education groups. Panels B and D show shift-share analyses of the within-education group component of equation (4) across four education groups within the formal-formal (panel B) and informal-informal (panel D) worker groups. Returns channel means holding the education composition fixed at its initial level and letting the within-group variances evolve as in the data. Composition channel means holding the within-group variances fixed at their initial level and letting the education composition evolve as in the data. *Source*: PME, 2002–2015.

group component in the same spirit as above. We focus on educational composition because Brazil experienced a rapid increase in educational attainment over this period.[1]

Figure E.1 plots the results of these exercises. As noted above, the great majority of the decline in the volatility of earnings among formal-formal and informal-informal workers is accounted for by the within component. The great majority of the fall in the within component is, in turn, driven by changes within education groups in the variance of earnings, as opposed to changes in the educational composition of the workforce combined with differences across education groups in their volatility of earnings.

[1] In unreported results, we find that compositional shifts in other demographic dimensions such as age and gender account for relatively little of the overall decline in the variance of residual log earnings changes over this period.

The reason is that although Brazil has seen rapid changes in educational composition over this period, the differences across education groups in the within-education group volatility of earnings are not that large. While the findings of this type of accounting exercise in the absence of an equilibrium model should be cautiously interpreted, at face value, they do suggest a limited role for rising educational attainment in driving the fall in earnings volatility among formal-formal and informal-informal workers.

References

Engbom, Niklas, Gustavo Gonzaga, Christian Moser, and Roberta Olivieri (2022), "Earnings inequality and dynamics in the presence of informality: The case of Brazil." *Quantitative Economics*, 13, 1405–1446. [23]

Co-editor Giovanni L. Violante handled this manuscript.

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