9 Agricultural sector: 1980−2003, output is GVA

9.1 Production function

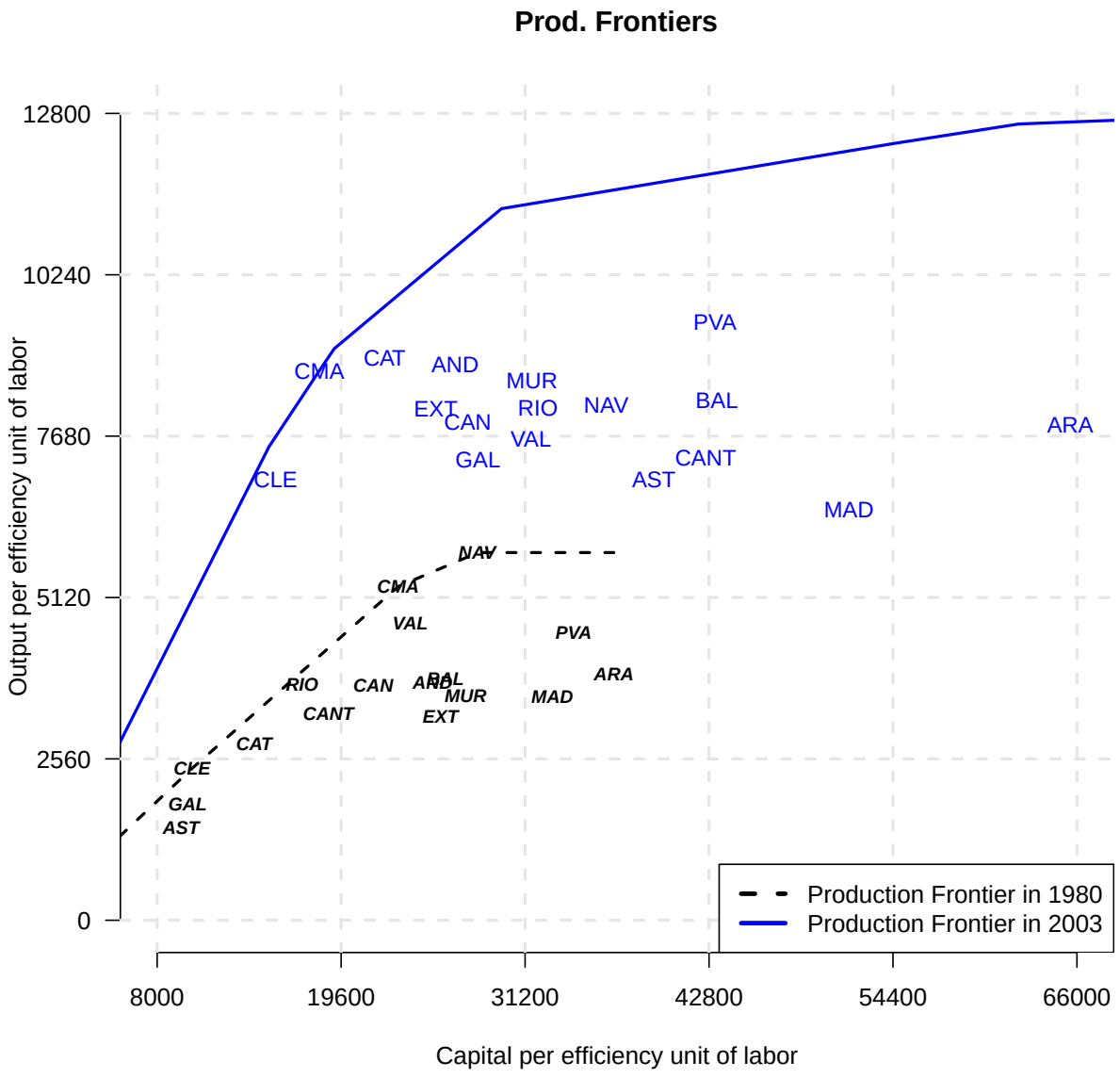

Figure 43: Production frontiers in 1980 and 2003

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1980 production frontier and the solid line presents the 2003 production frontier.

9.2 Table with decomposition results

Table 15: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.68	0.83	201.6	20.8	87.8	10.9	19.9
2	Aragon	0.67	0.62	158.3	-7.2	107.6	6.9	25.4
3	Asturias	0.66	0.6	495.3	-9.0	105.8	183.5	12.2
4	Balearic Islands	0.68	0.7	196.0	1.8	95.4	16.9	27.3
5	Basque Country	0.75	0.73	174.7	-3.3	90.9	25.3	18.7
6	Canary Islands	0.76	0.62	207.2	-18.3	104.8	52.9	20.1
7	Cantabria	1	0.91	246.6	-8.7	112.9	77.8	0.3
8	Castilla-La Mancha	1	1	108.6	0.0	97.4	-0.4	6.1
9	Castilla y Leon	0.85	0.91	293.4	7.4	102.3	73.0	4.7
10	Catalonia	0.88	0.67	111.8	-23.2	91.1	18.5	21.8
11	Extremadura	0.58	0.78	238.3	34.2	87.8	9.6	22.5
12	Galicia	0.79	0.67	404.2	-15.6	99.5	165.2	12.9
13	Madrid	0.61	0.53	136.5	-12.2	102.4	8.2	22.9
14	Murcia	0.62	0.75	205.7	21.5	91.5	9.7	19.7
15	Navarra	1	0.71	77.0	-29.3	93.2	9.0	18.9
16	Rioja	0.78	0.8	171.3	2.2	100.0	5.9	25.3
17	Valencian Community	0.95	0.71	192.1	-24.7	102.6	62.6	17.7
	average	0.78	0.74	212.8	-3.7	98.4	43.3	17.4
	weighted average	0.77	0.72	197.2	-5.0	96.6	38.0	18.3

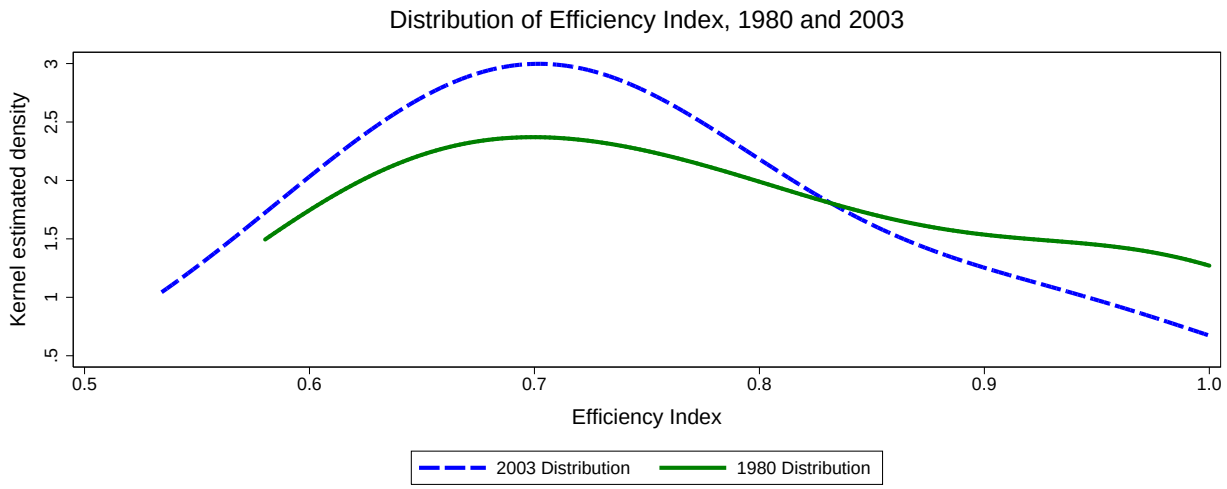

Figure 44: Distributions of efficiency scores in 1980 and 2003

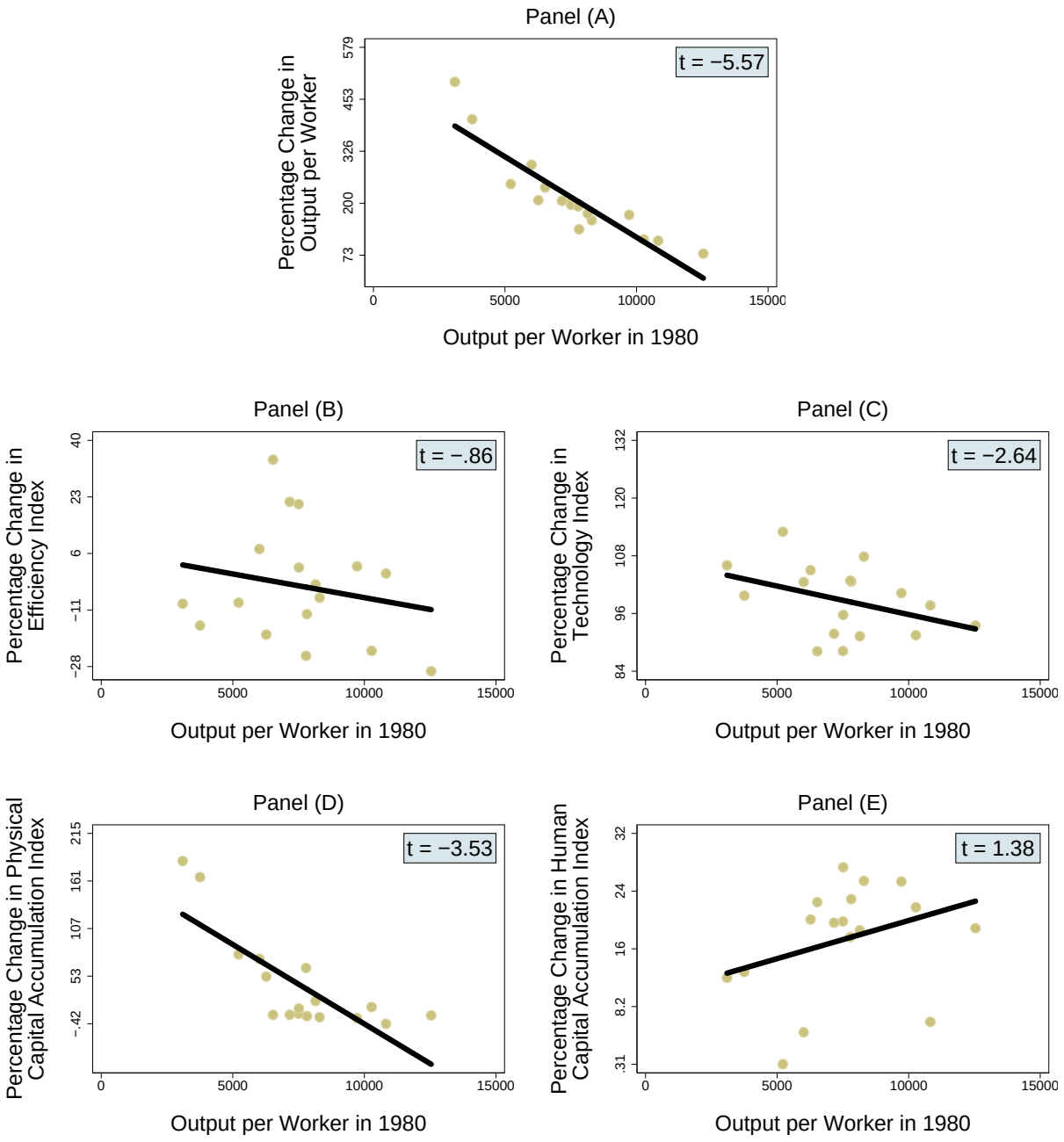

Figure 45: Percentage change (from 1980 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

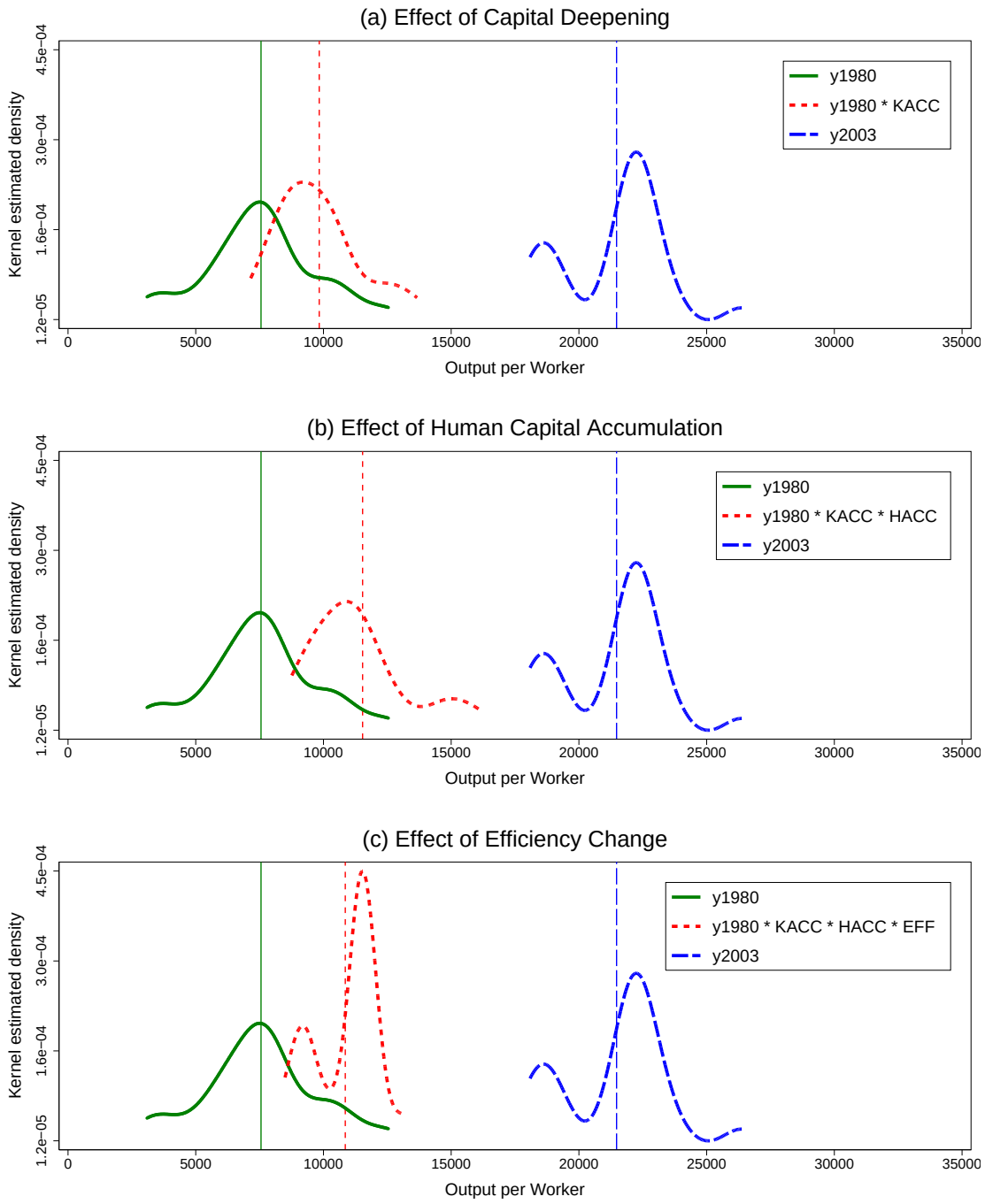

Figure 46: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

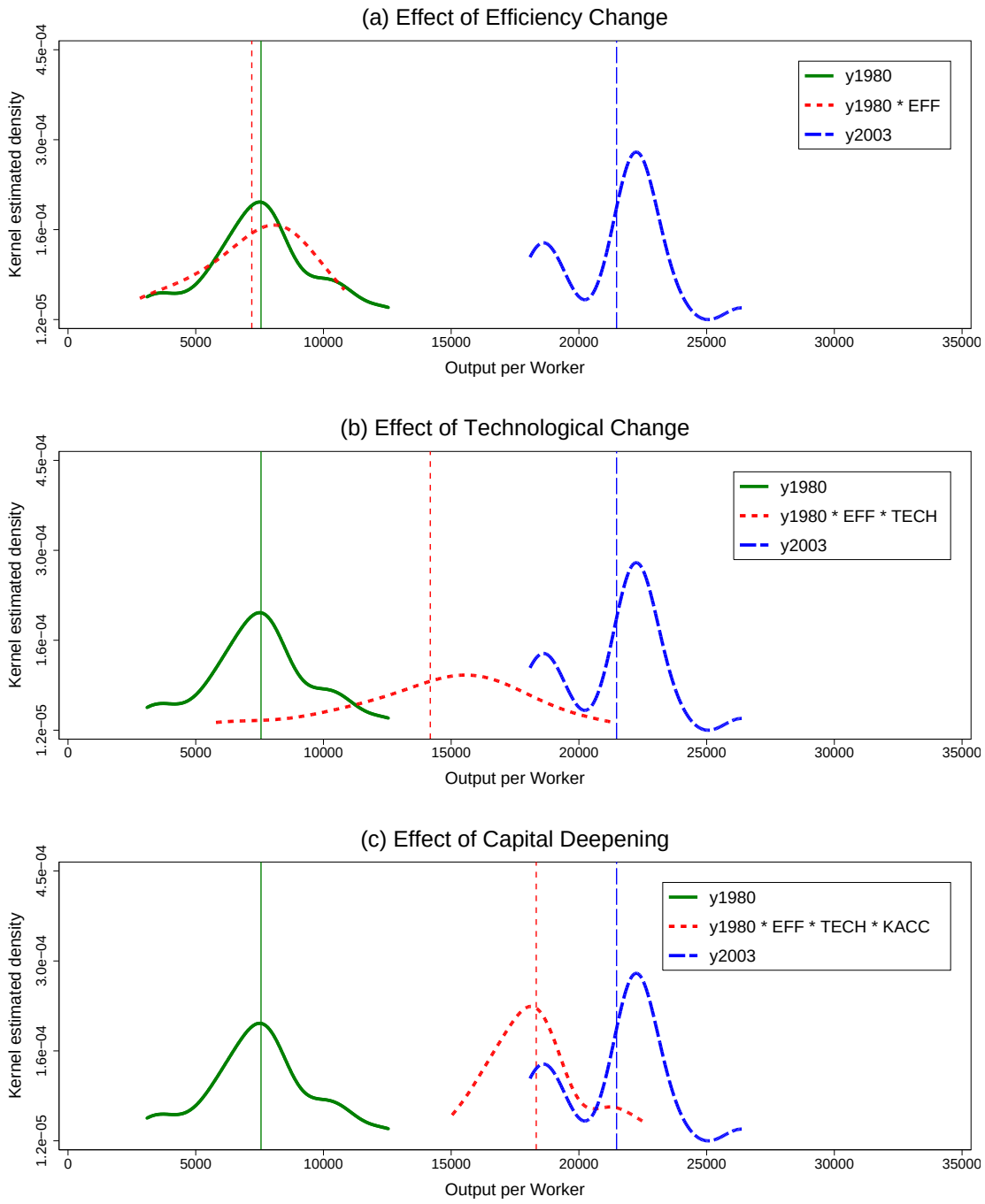

Figure 47: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

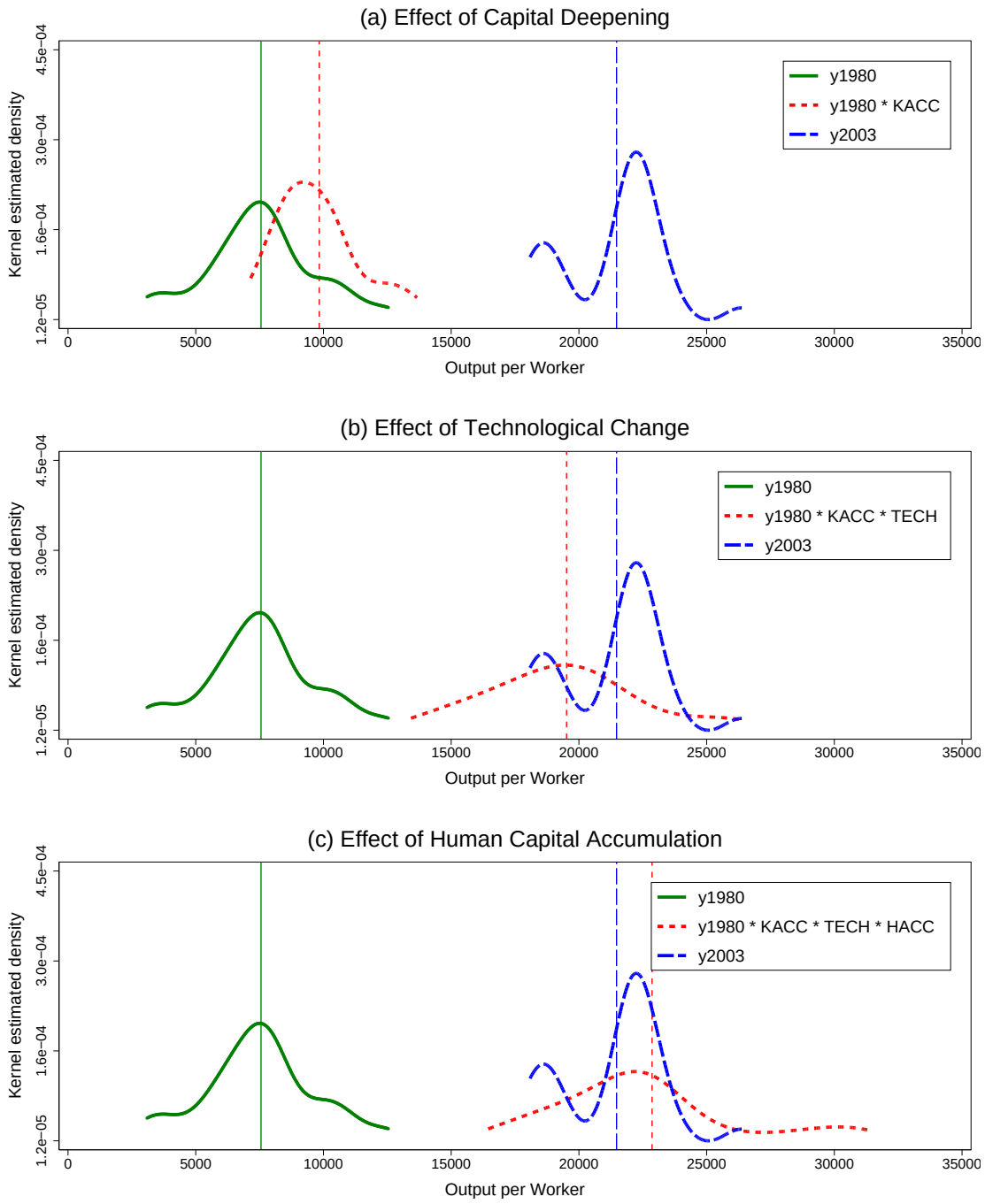

Figure 48: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

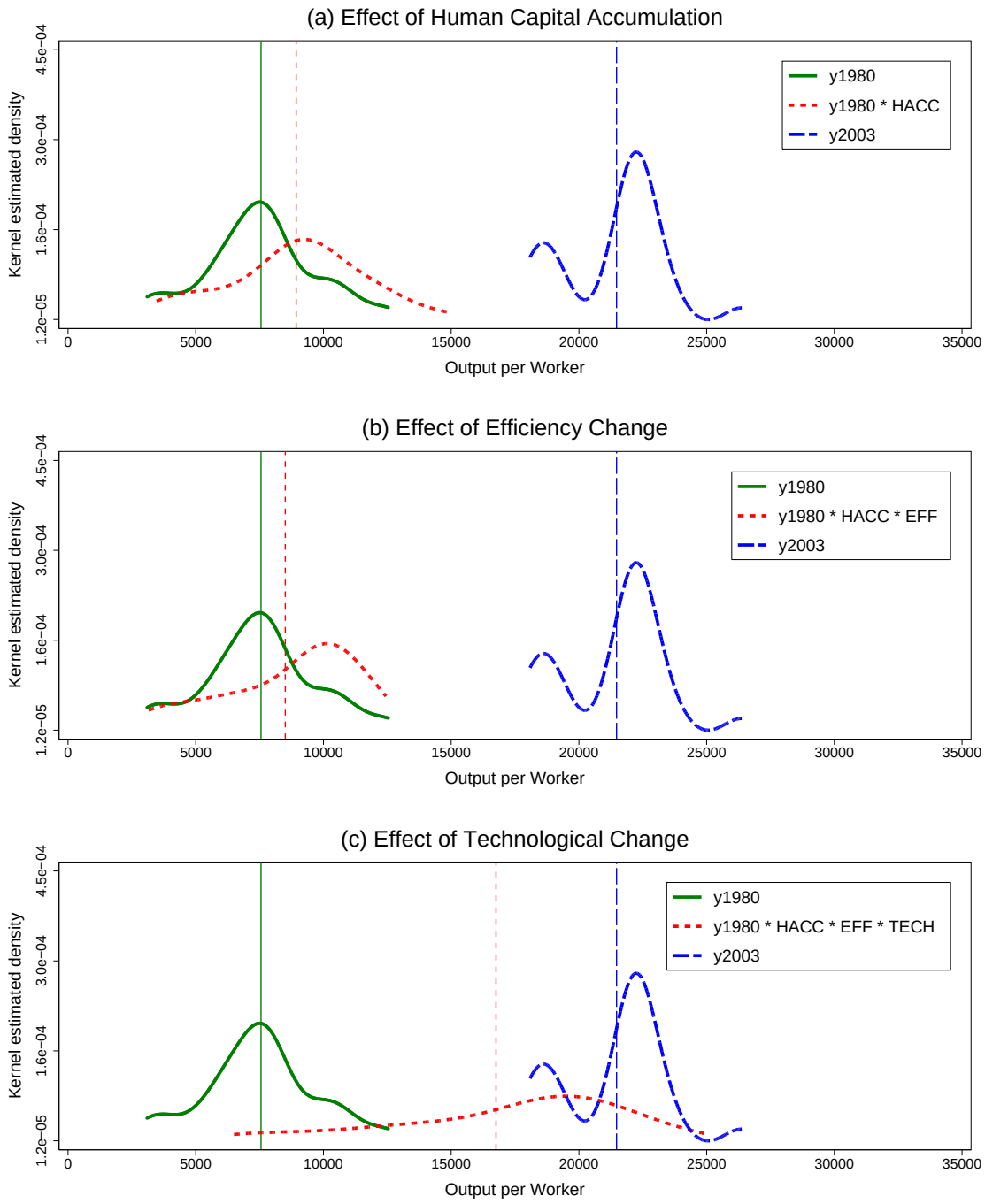

Figure 49: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 16: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1980})$	0.0000
2	$g(y_{2003})$ vs. $f(y_{1980} \times EFF)$	0.0000
3	$g(y_{2003})$ vs. $f(y_{1980} \times TECH)$	0.0002
4	$g(y_{2003})$ vs. $f(y_{1980} \times KACC)$	0.0000
5	$g(y_{2003})$ vs. $f(y_{1980} \times HACC)$	0.0000
6	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.0000
7	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0000
8	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0000
9	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.0026
10	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.0102
11	$g(y_{2003})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.0000
12	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.0042
13	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.0016
14	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0000
15	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.8998

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

10 Agricultural sector: 1980−1994, output is GVA

10.1 Production function

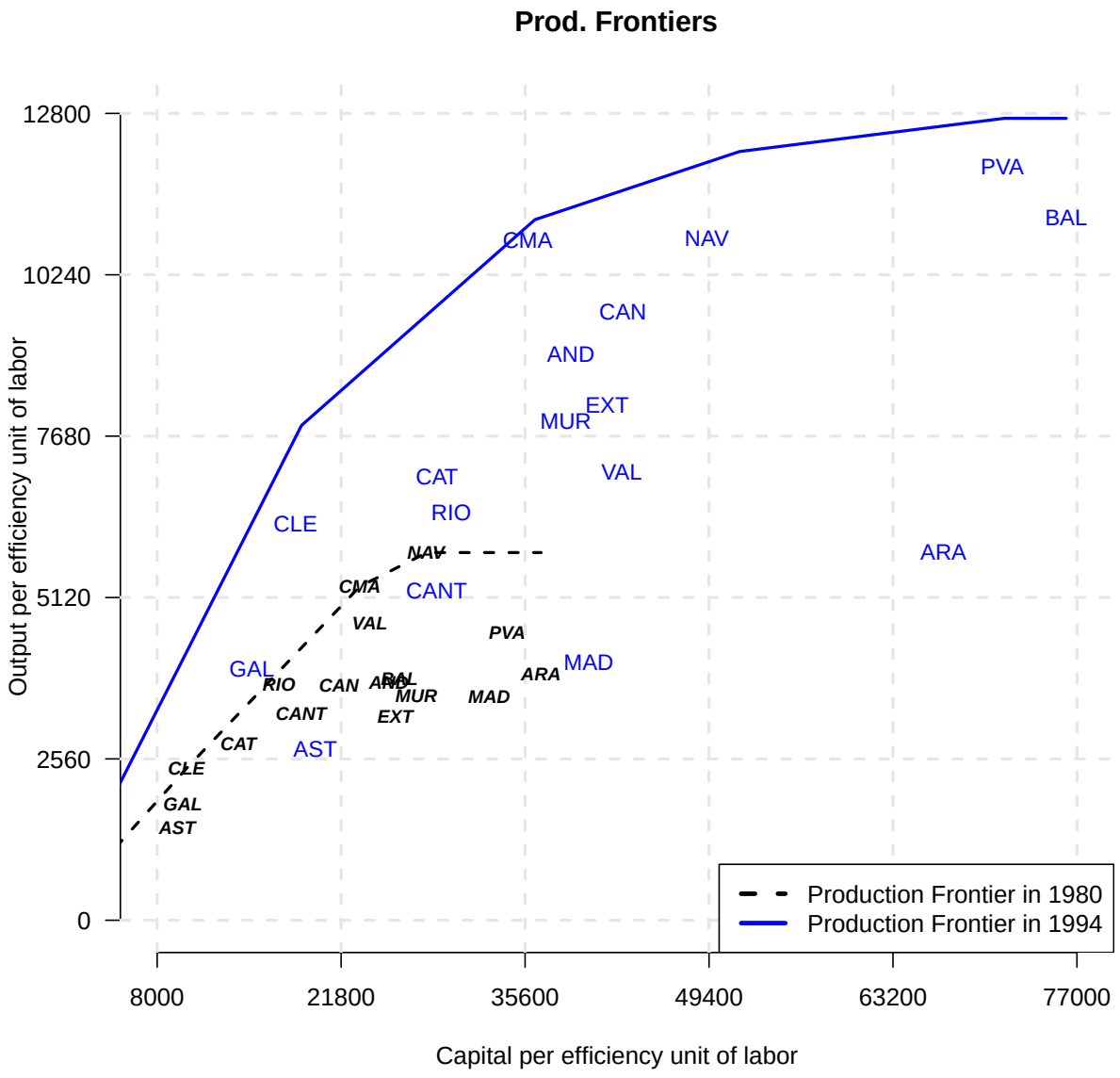

Figure 50: Production frontiers in 1980 and 1994

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 1994 observations. The dotted line represents the 1980 production frontier and the solid line presents the 1994 production frontier.

10.2 Table with decomposition results

Table 17: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−1994

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.68	0.79	177.9	16.2	78.3	19.3	12.4
2	Aragon	0.67	0.46	71.7	-30.7	103.2	10.5	10.4
3	Asturias	0.66	0.34	102.6	-48.4	76.6	122.1	0.1
4	Balearic Islands	0.68	0.88	268.0	28.3	89.3	27.0	19.4
5	Basque Country	0.75	0.83	208.0	10.6	83.3	34.2	13.2
6	Canary Islands	0.76	0.54	89.6	-29.3	74.1	41.3	9.1
7	Cantabria	1	0.82	190.0	-17.9	79.0	97.0	0.2
8	Castilla-La Mancha	1	0.98	130.0	-2.0	75.8	21.8	9.6
9	Castilla y Leon	0.85	0.72	170.6	-15.4	73.4	77.6	3.8
10	Catalonia	0.88	0.61	74.3	-29.9	80.3	23.6	11.5
11	Extremadura	0.58	0.71	186.4	22.6	79.9	18.2	9.9
12	Galicia	0.79	0.63	134.3	-19.7	78.3	63.5	0.2
13	Madrid	0.61	0.36	53.4	-40.9	87.3	12.8	22.8
14	Murcia	0.62	0.7	154.3	13.4	78.3	13.9	10.4
15	Navarra	1	0.9	126.4	-10.0	84.2	17.9	15.8
16	Rioja	0.78	0.94	194.9	19.9	100.3	12.7	8.9
17	Valencian Community	0.95	0.65	100.0	-31.3	75.6	54.2	7.5
	average	0.78	0.7	143.1	-9.7	82.2	39.3	9.7
	weighted average	0.77	0.66	126.1	-14.1	80.4	34.8	11.0

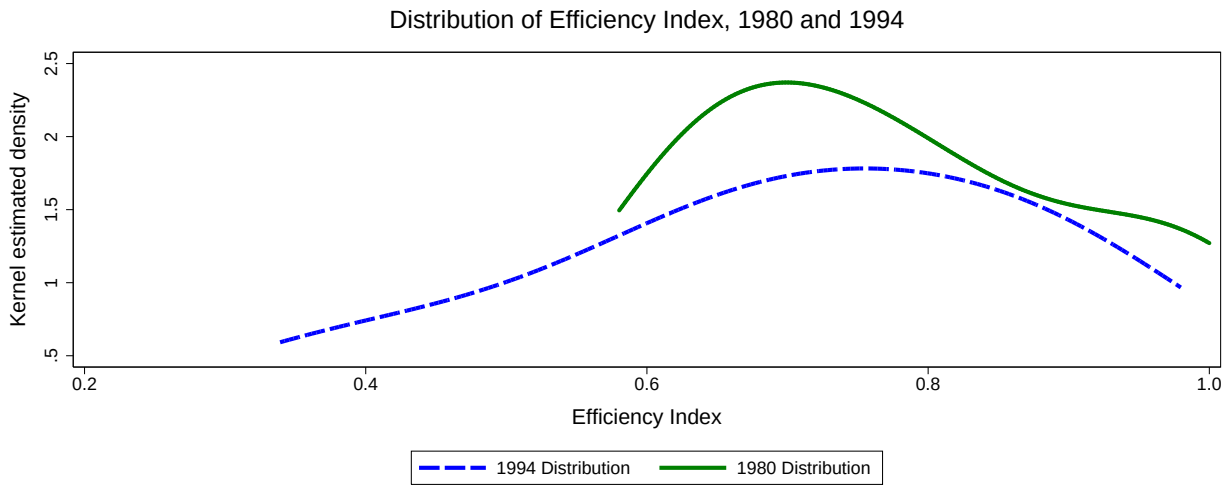

Figure 51: Distributions of efficiency scores in 1980 and 1994

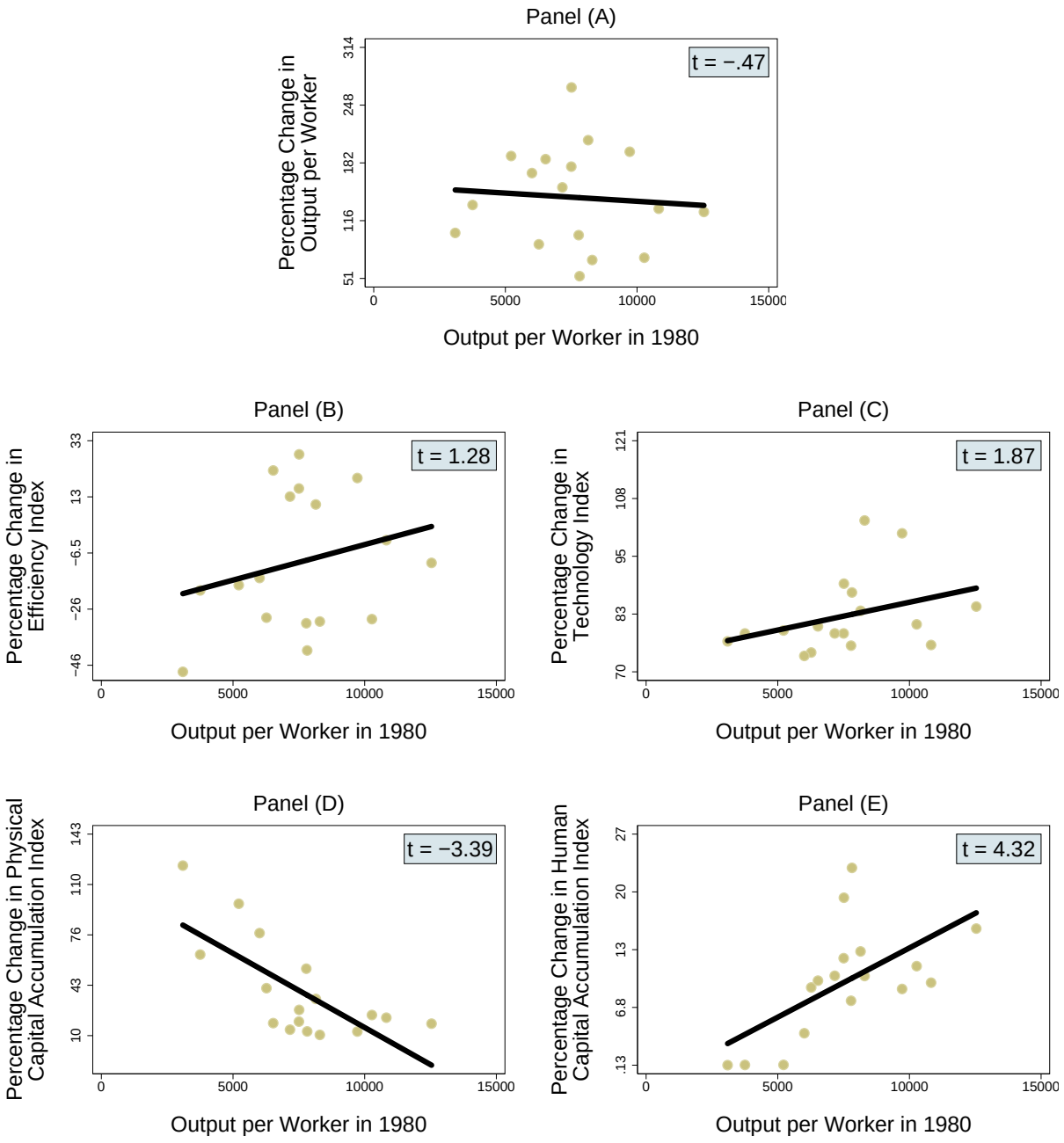

Figure 52: Percentage change (from 1980 to 1994) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

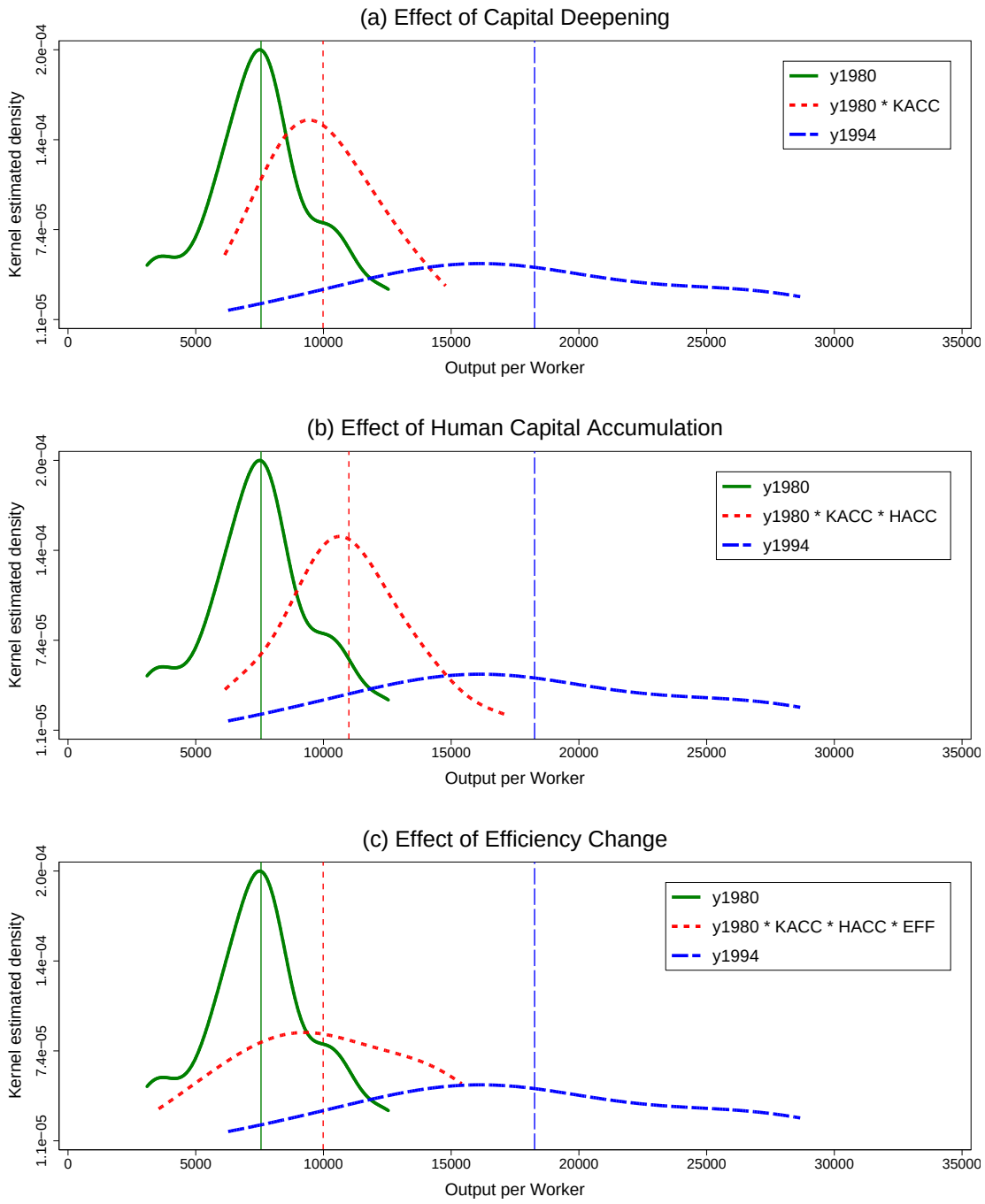

Figure 53: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

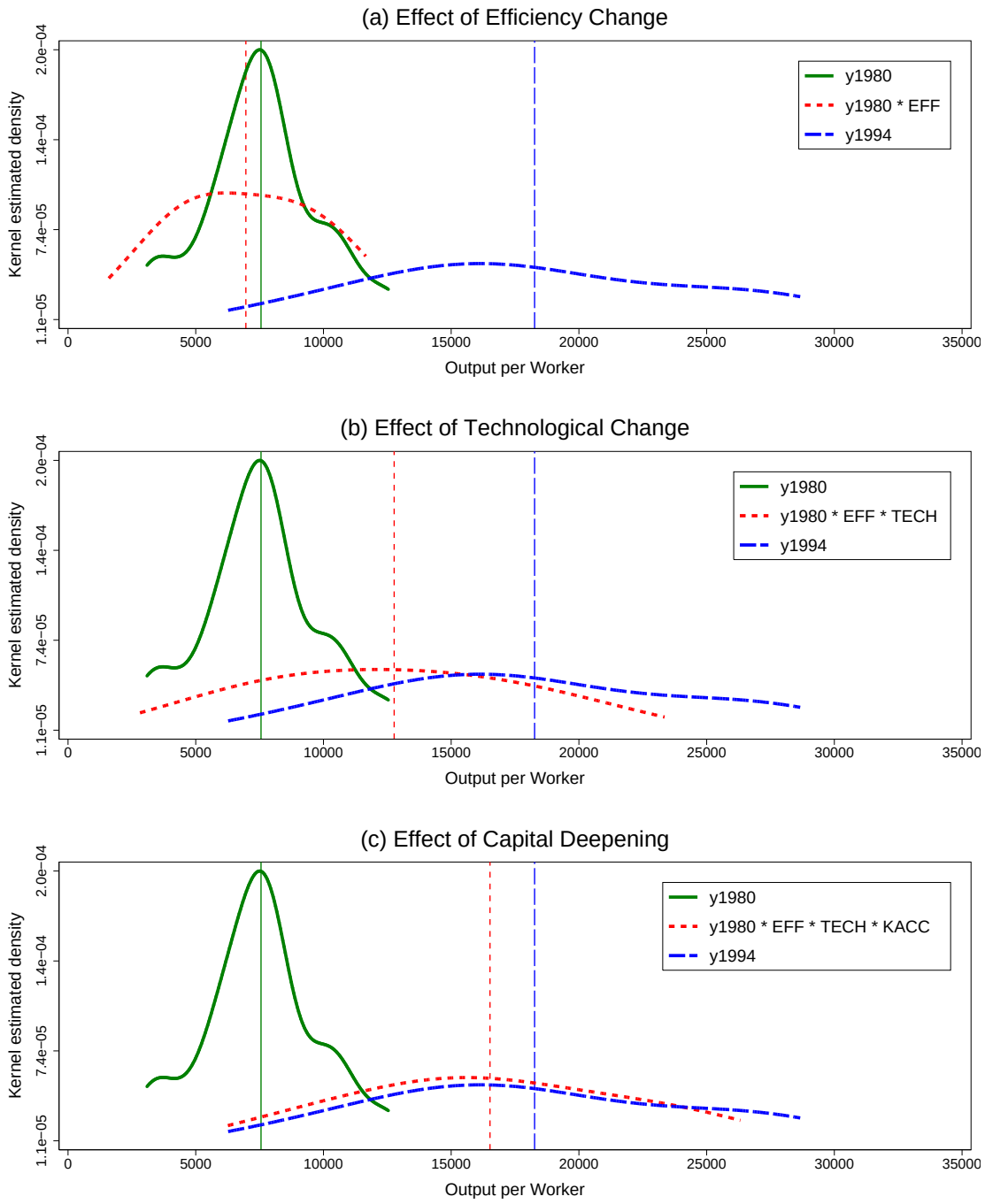

Figure 54: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

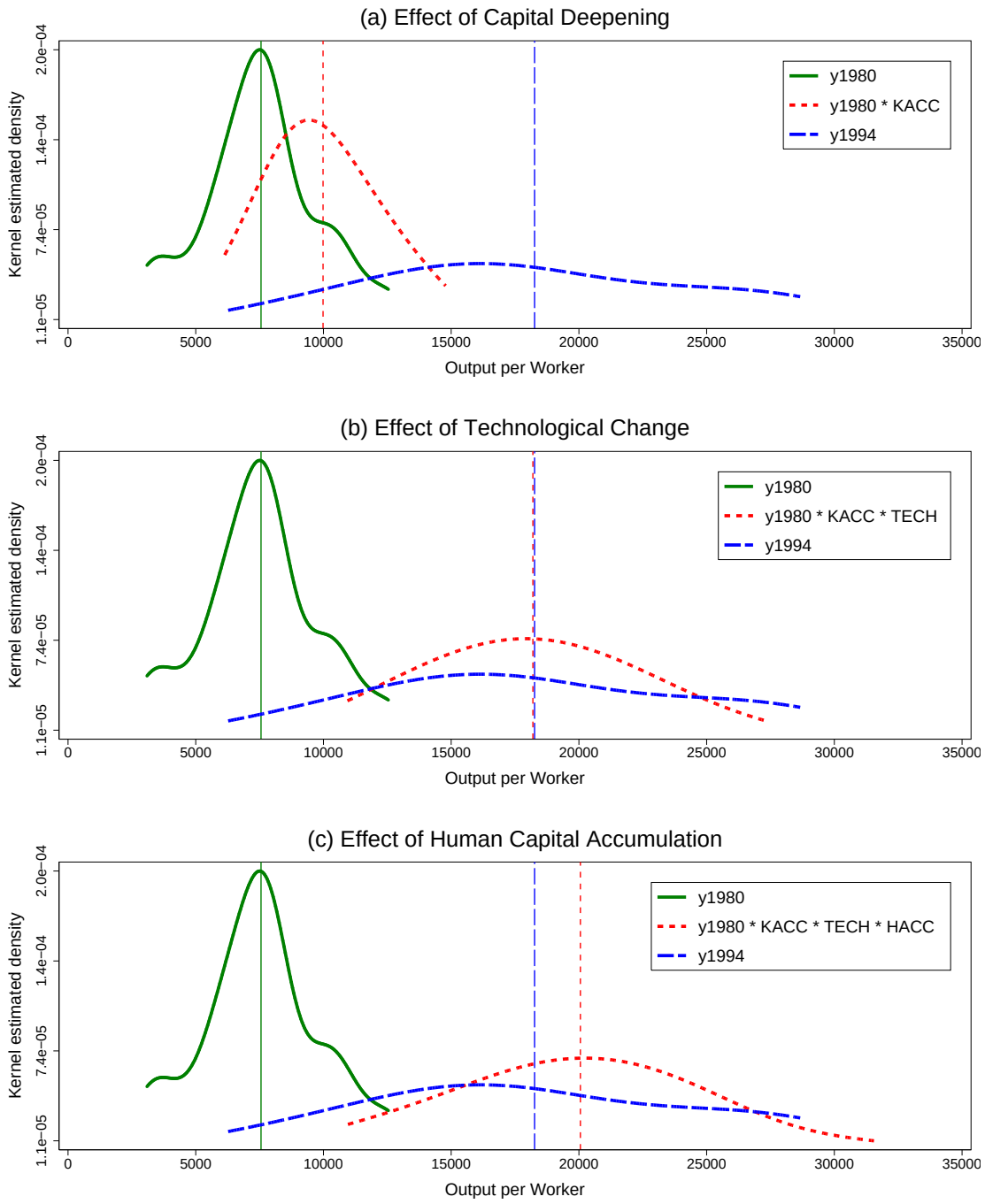

Figure 55: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

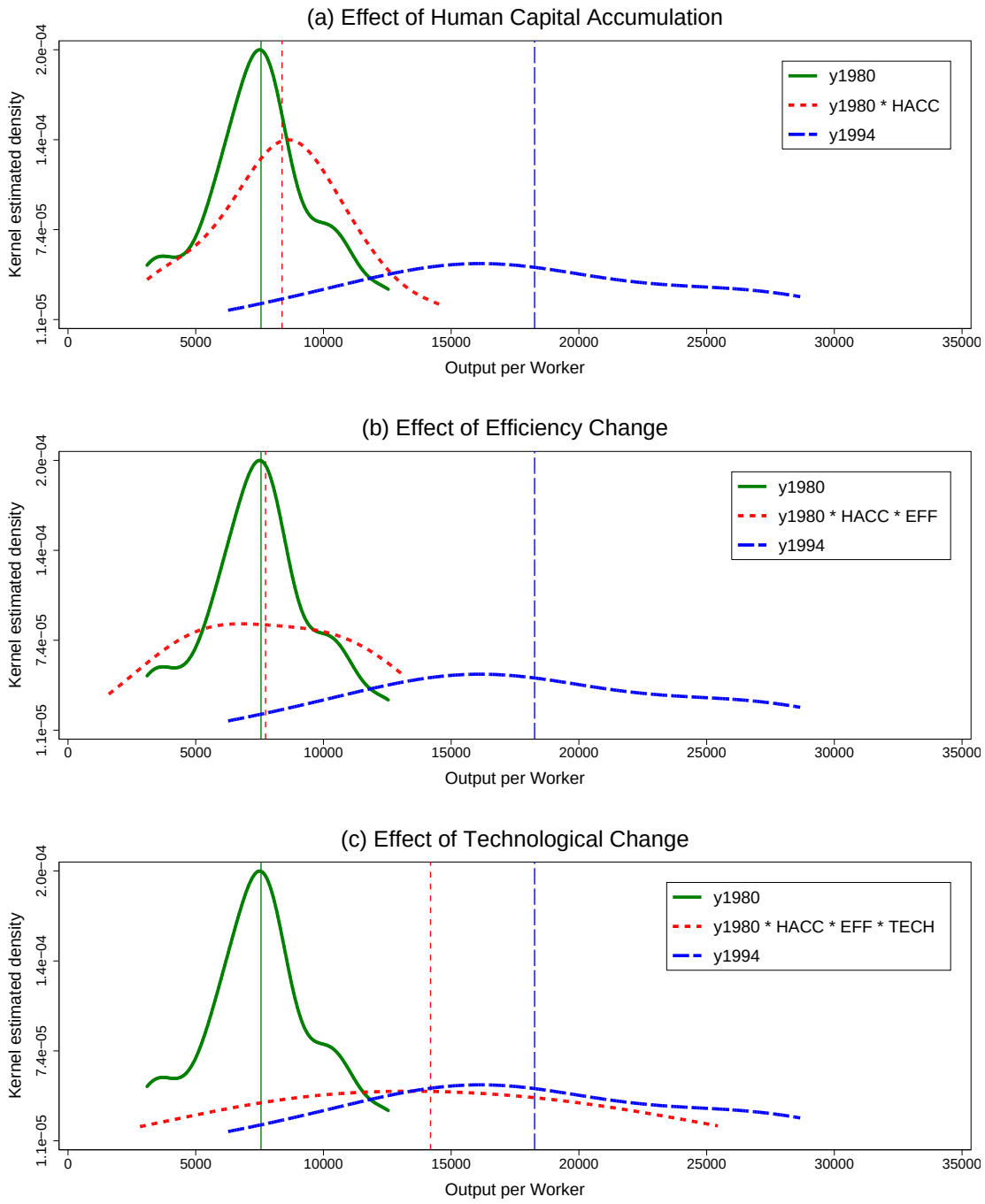

Figure 56: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 18: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{1994})$ vs. $f(y_{1980})$	0.0004
2	$g(y_{1994})$ vs. $f(y_{1980} \times EFF)$	0.0002
3	$g(y_{1994})$ vs. $f(y_{1980} \times TECH)$	0.4334
4	$g(y_{1994})$ vs. $f(y_{1980} \times KACC)$	0.0006
5	$g(y_{1994})$ vs. $f(y_{1980} \times HACC)$	0.0006
6	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.3326
7	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0010
8	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0000
9	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.7906
10	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.9294
11	$g(y_{1994})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.0036
12	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.8626
13	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.7484
14	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0116
15	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.5710

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

11 Agricultural sector: 1995−2003, output is GVA

11.1 Production function

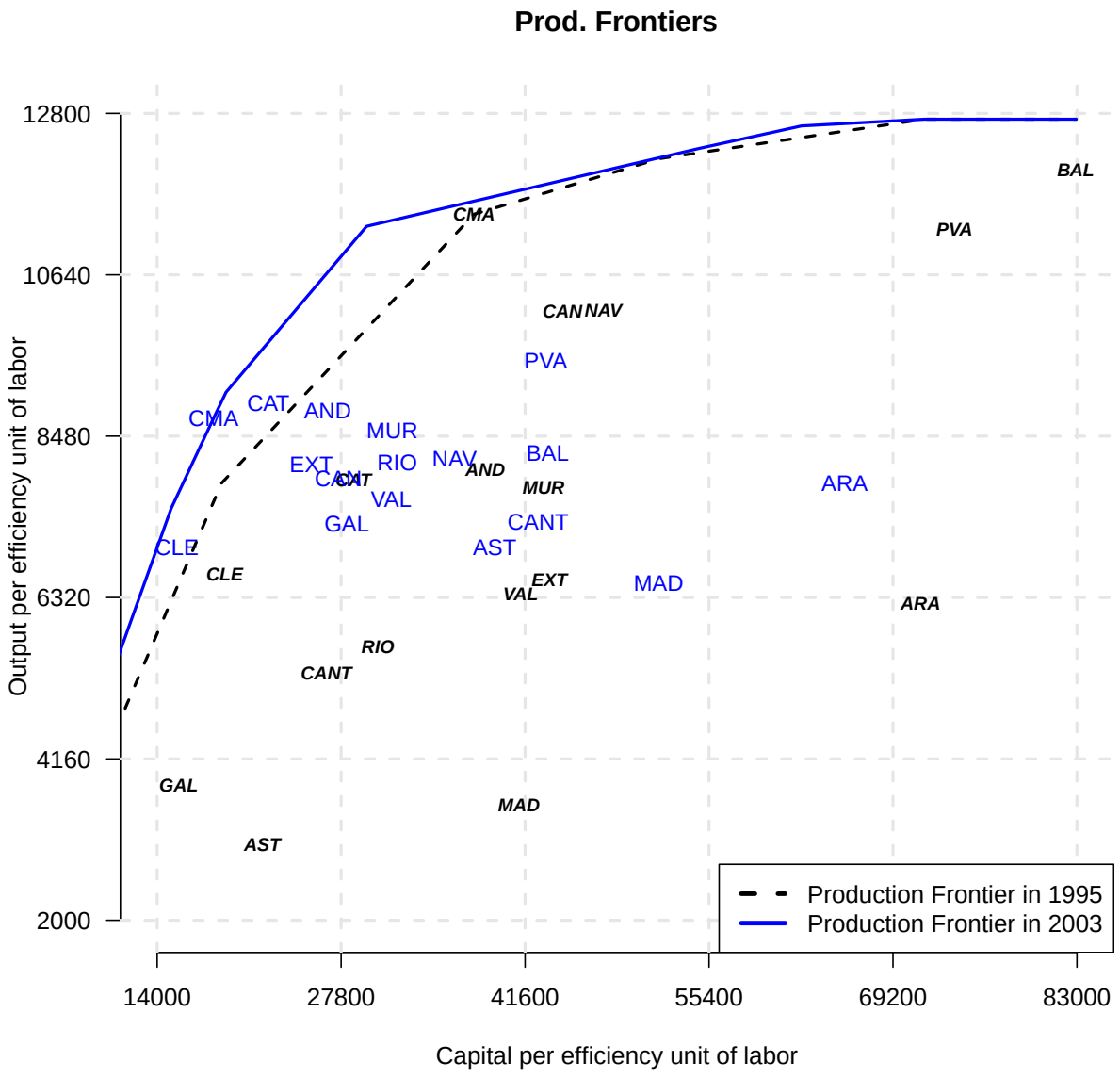

Figure 57: Production frontiers in 1995 and 2003

Notes: The bold italic abbreviations show the 1995 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1995 production frontier and the solid line presents the 2003 production frontier.

11.2 Table with decomposition results

Table 19: Efficiency scores and percentage change of quadripartite decomposition indexes, 1995−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.7	0.83	20.0	18.2	7.5	-11.0	6.0
2	Aragon	0.49	0.62	38.3	26.4	0.4	0.1	8.9
3	Asturias	0.36	0.6	163.7	66.9	7.7	34.4	9.2
4	Balearic Islands	0.95	0.7	-28.7	-26.5	0.5	-6.9	3.7
5	Basque Country	0.86	0.73	-17.1	-15.2	7.2	-12.4	4.1
6	Canary Islands	0.57	0.62	54.8	9.3	7.3	22.8	7.5
7	Cantabria	0.84	0.91	12.0	8.6	16.6	-12.1	0.6
8	Castilla-La Mancha	1	1	-15.5	0.0	7.9	-26.6	6.6
9	Castilla y Leon	0.81	0.91	25.2	12.8	14.1	-7.4	5.0
10	Catalonia	0.55	0.67	31.7	22.9	5.8	-4.4	6.1
11	Extremadura	0.56	0.78	46.6	39.5	7.3	-12.4	11.7
12	Galicia	0.59	0.67	120.1	13.8	16.3	60.8	3.4
13	Madrid	0.3	0.53	93.5	75.2	0.6	5.0	4.6
14	Murcia	0.67	0.75	17.5	13.2	5.7	-5.9	4.4
15	Navarra	0.85	0.71	-18.0	-16.8	2.0	-4.5	1.2
16	Rioja	0.88	0.8	1.5	-9.5	0.5	-5.0	17.4
17	Valencian Community	0.56	0.71	66.5	27.1	11.1	10.0	7.2
	average	0.68	0.74	36.0	15.7	7.0	1.4	6.3
	weighted average	0.62	0.72	44.4	24.2	7.2	1.8	5.9

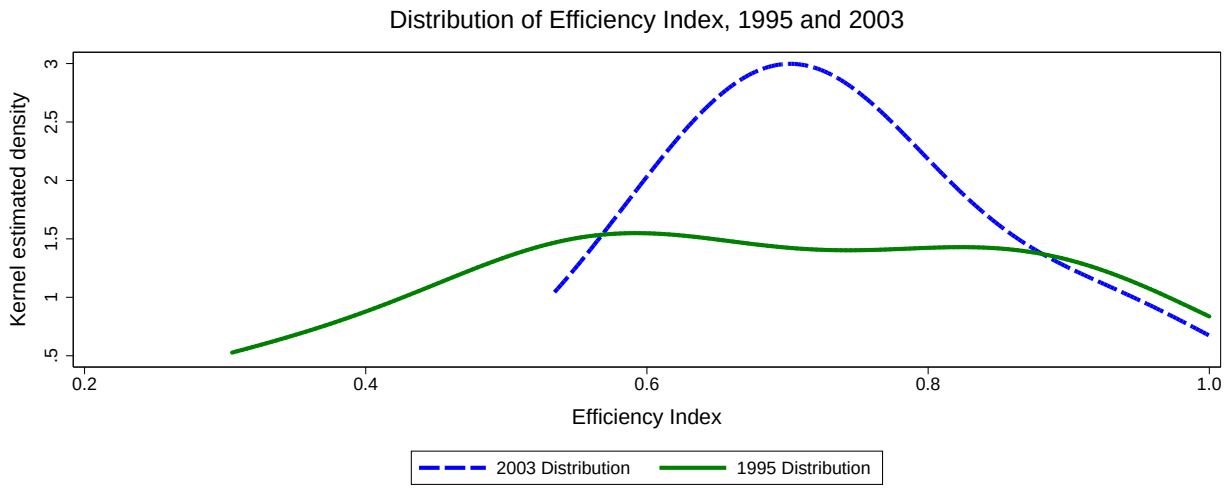

Figure 58: Distributions of efficiency scores in 1995 and 2003

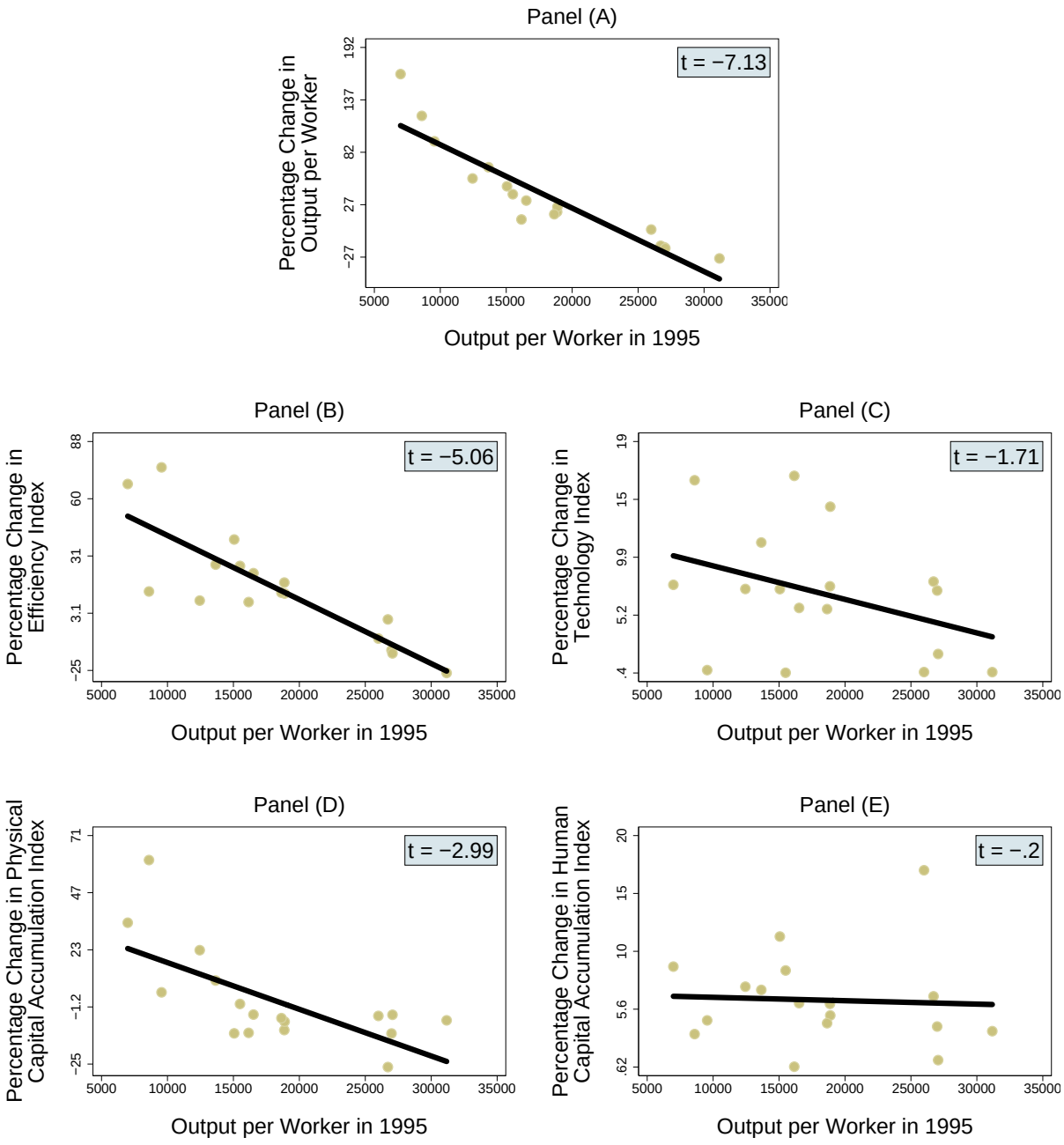

Figure 59: Percentage change (from 1995 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1995

Note: Each panel contains a GLS regression line.

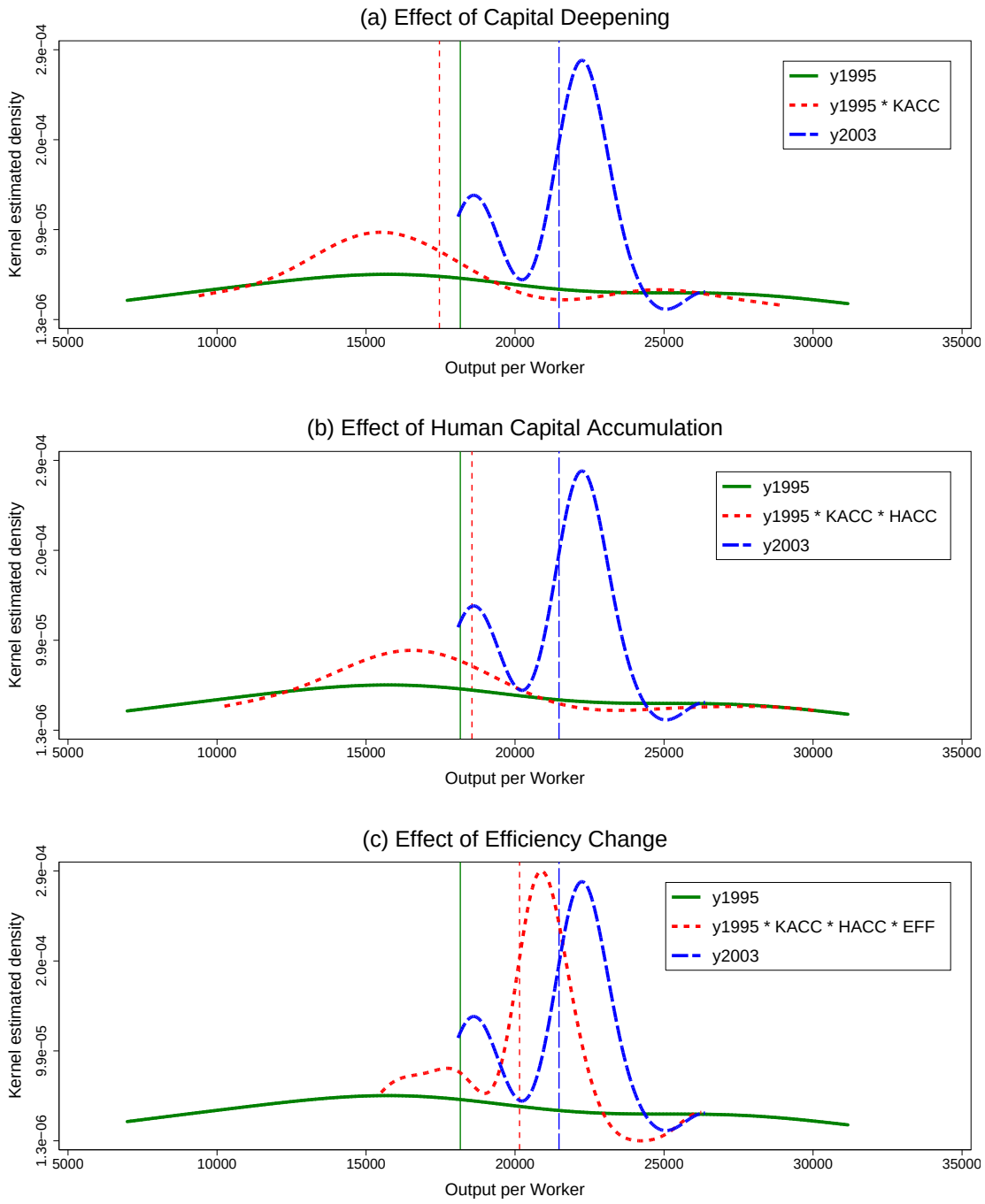

Figure 60: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1995 distribution.

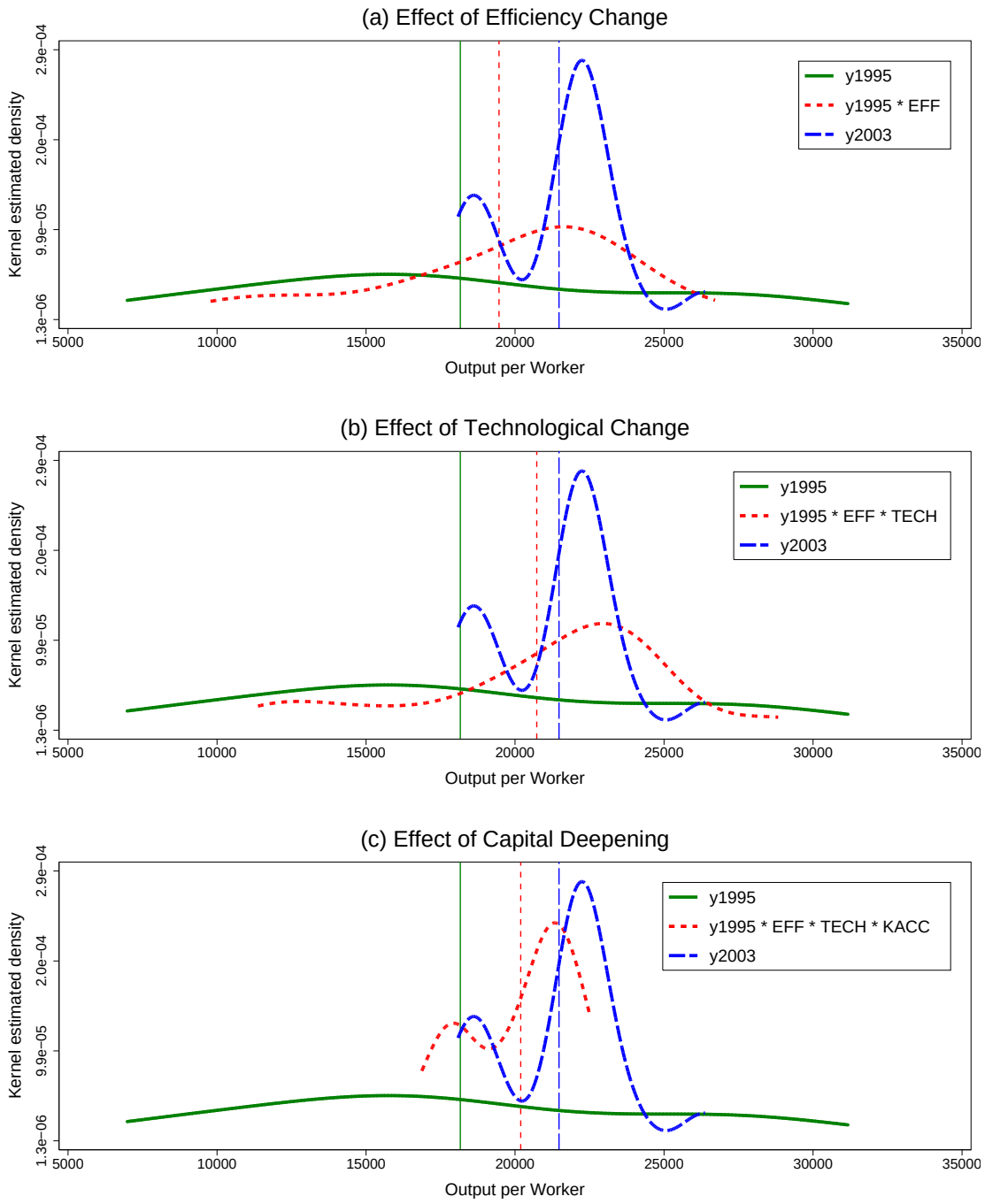

Figure 61: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1995 distribution.

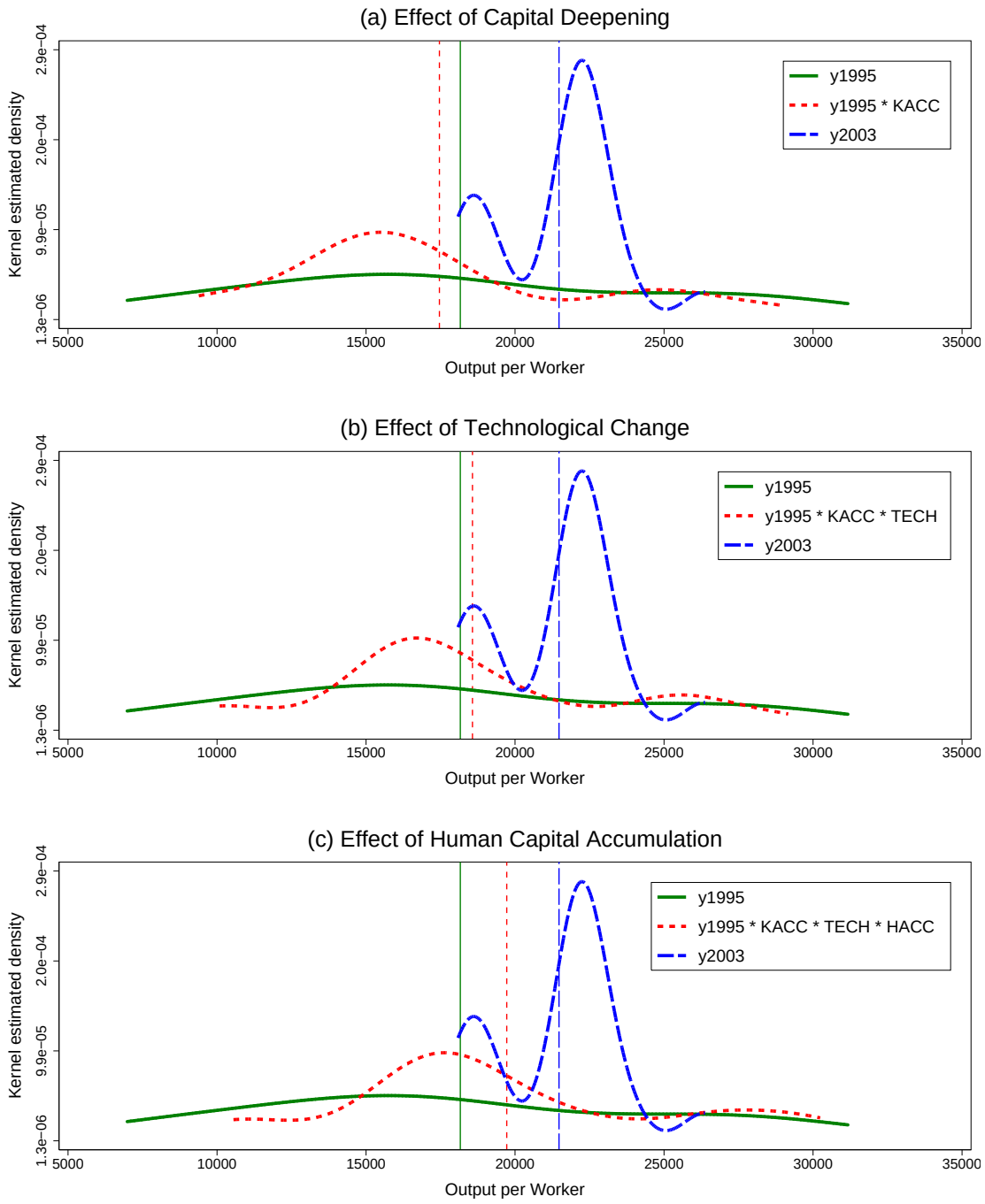

Figure 62: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1995 distribution.

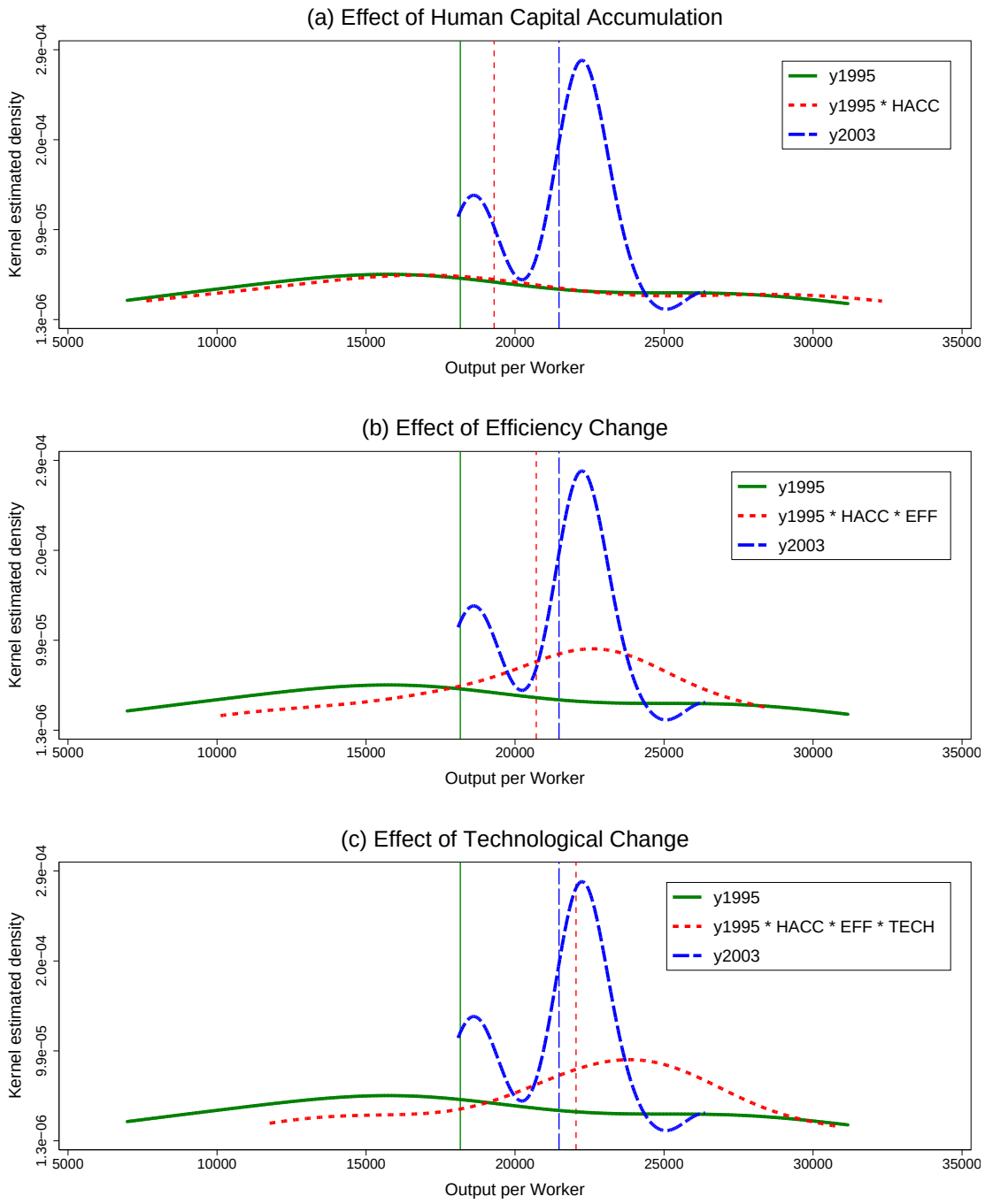

Figure 63: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1995 distribution.

Table 20: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1995})$	0.0002
2	$g(y_{2003})$ vs. $f(y_{1995} \times EFF)$	0.0720
3	$g(y_{2003})$ vs. $f(y_{1995} \times TECH)$	0.0004
4	$g(y_{2003})$ vs. $f(y_{1995} \times KACC)$	0.0000
5	$g(y_{2003})$ vs. $f(y_{1995} \times HACC)$	0.0000
6	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH)$	0.0298
7	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC)$	0.0026
8	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times HACC)$	0.0768
9	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC)$	0.0000
10	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times HACC)$	0.0054
11	$g(y_{2003})$ vs. $f(y_{1995} \times KACC \times HACC)$	0.0000
12	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times KACC)$	0.0482
13	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times HACC)$	0.0028
14	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC \times HACC)$	0.0008
15	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC \times HACC)$	0.0020

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

12 Construction sector: 1980−2003, output is GVA

12.1 Production function

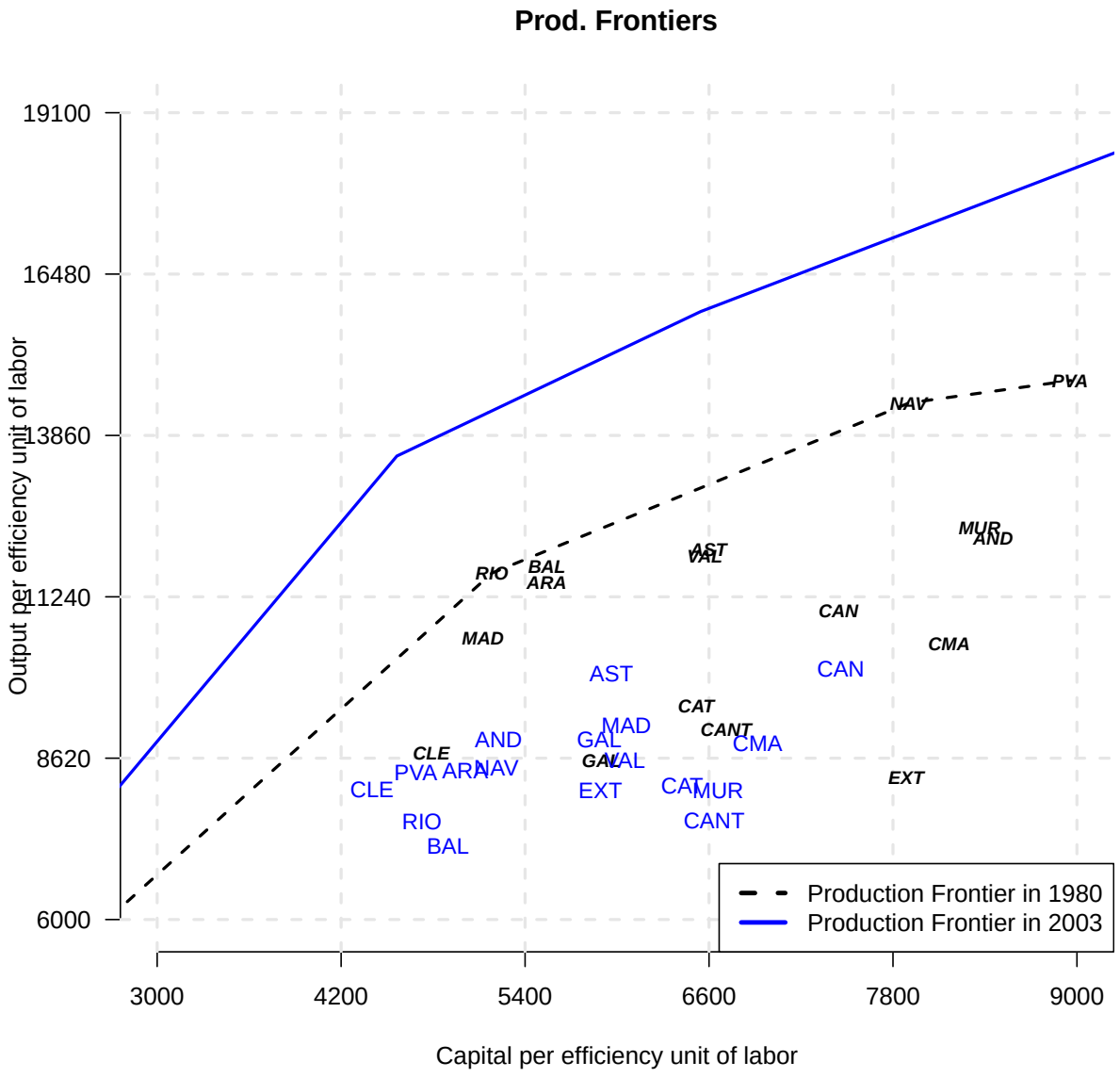

Figure 64: Production frontiers in 1980 and 2003

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1980 production frontier and the solid line presents the 2003 production frontier.

12.2 Table with decomposition results

Table 21: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.84	0.62	-5.13	-25.38	22	-9.46	15.1
2	Aragon	0.96	0.6	-4.31	-37.33	23.77	9.88	12.26
3	Asturias	0.92	0.66	6.88	-28.4	22.09	7.56	13.68
4	Balearic Islands	0.98	0.52	-16.9	-47.09	24.59	11.85	12.71
5	Basque Country	0.79	0.6	19.17	-23.98	20.17	9.18	19.48
6	Canary Islands	0.69	0.48	8	-30.83	21.74	11.29	15.25
7	Cantabria	0.81	0.62	21.46	-23.26	30.28	16.58	4.21
8	Castilla-La Mancha	0.72	0.55	9.03	-24.47	20.77	2.79	16.29
9	Castilla y Leon	0.73	0.52	11.6	-28.73	22.04	11.76	14.8
10	Catalonia	0.91	0.56	-6.04	-38.5	22.09	9.33	14.46
11	Extremadura	0.58	0.54	31.86	-7.16	20.83	0.36	17.12
12	Galicia	0.69	0.59	36.2	-14.88	22.3	13.96	14.81
13	Madrid	0.92	0.6	10.85	-34.93	22.83	26.36	9.75
14	Murcia	0.85	0.51	-14.58	-40.33	21.41	1.19	16.53
15	Navarra	1	0.59	-21.65	-40.81	20.97	-6.18	16.63
16	Rioja	1	0.61	-29.54	-38.66	26.55	-17.05	9.43
17	Valencian Community	1	0.55	-11.81	-44.59	25.98	15.32	9.56
	average	0.85	0.57	2.65	-31.14	22.97	6.75	13.65
	weighted average	0.85	0.58	2.96	-31.49	22.59	8.36	13.72

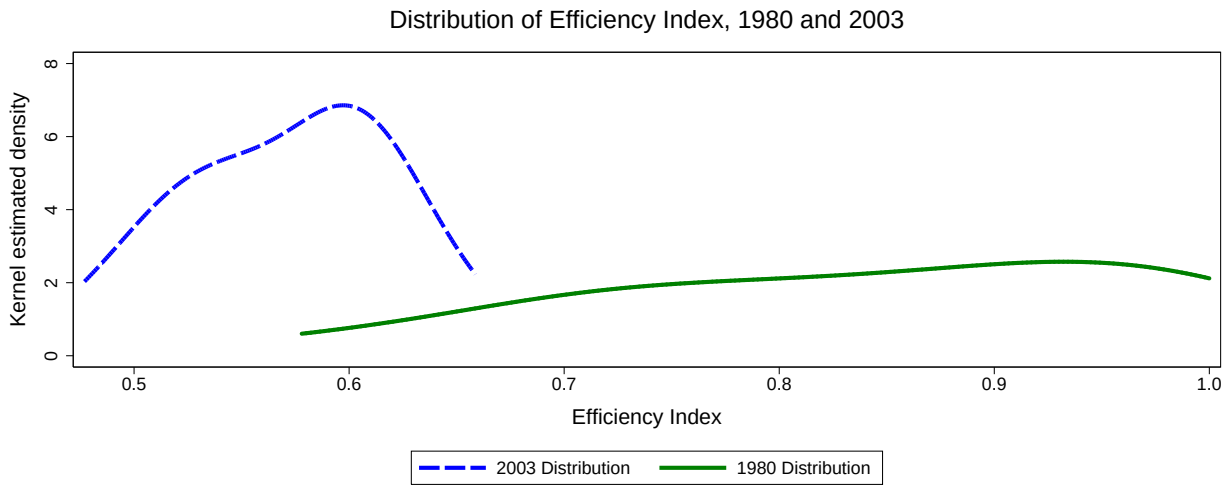

Figure 65: Distributions of efficiency scores in 1980 and 2003

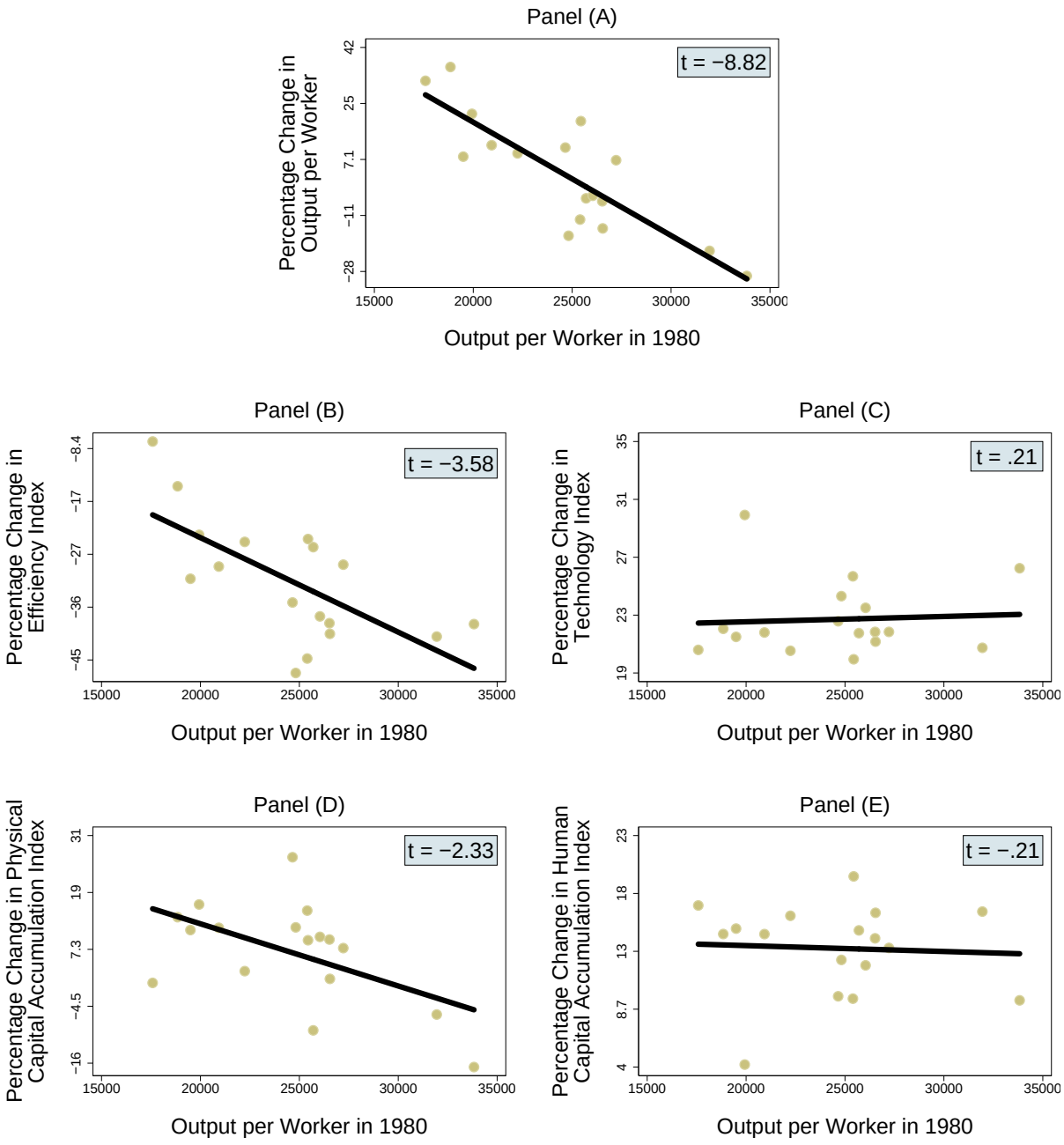

Figure 66: Percentage change (from 1980 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

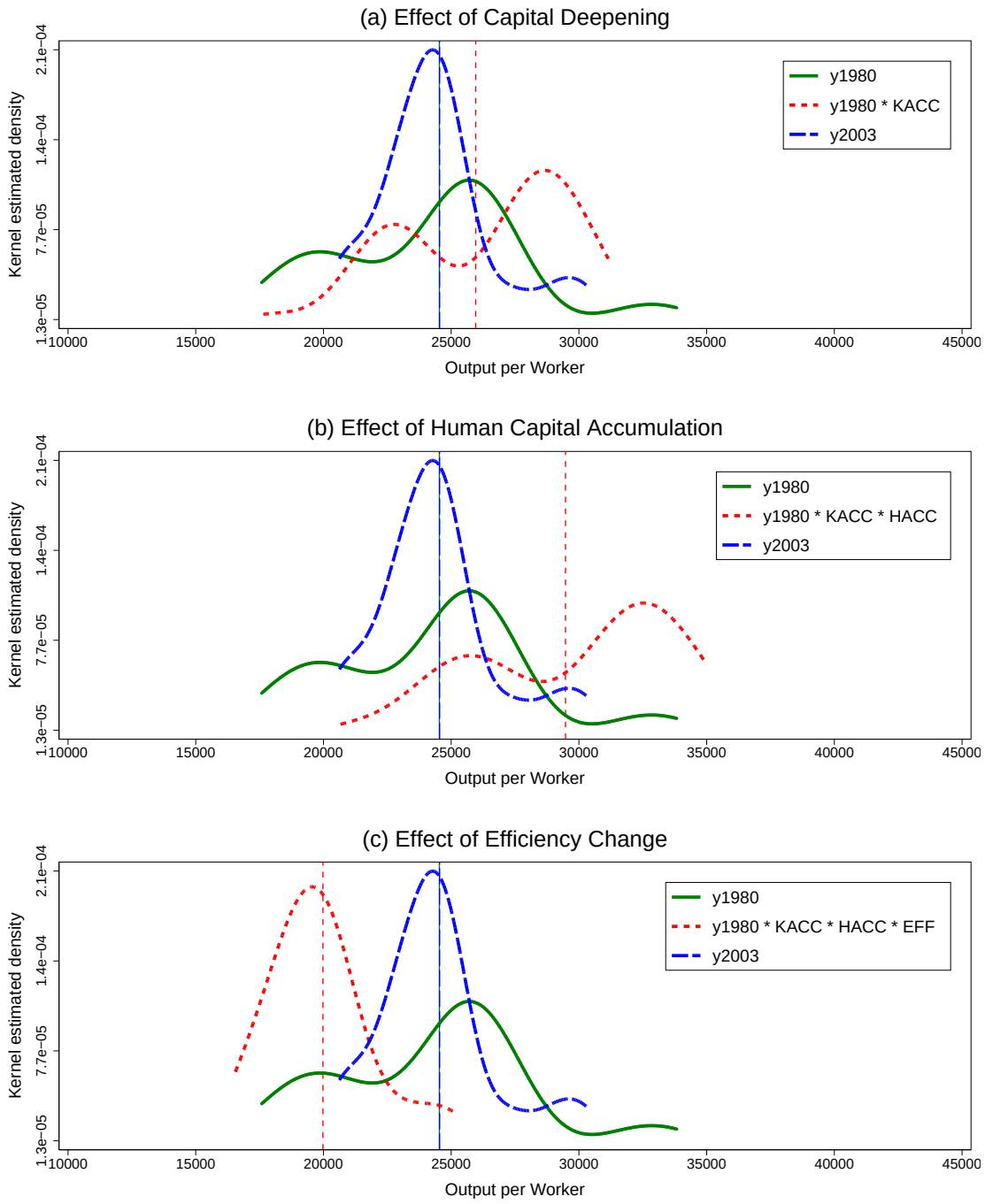

Figure 67: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

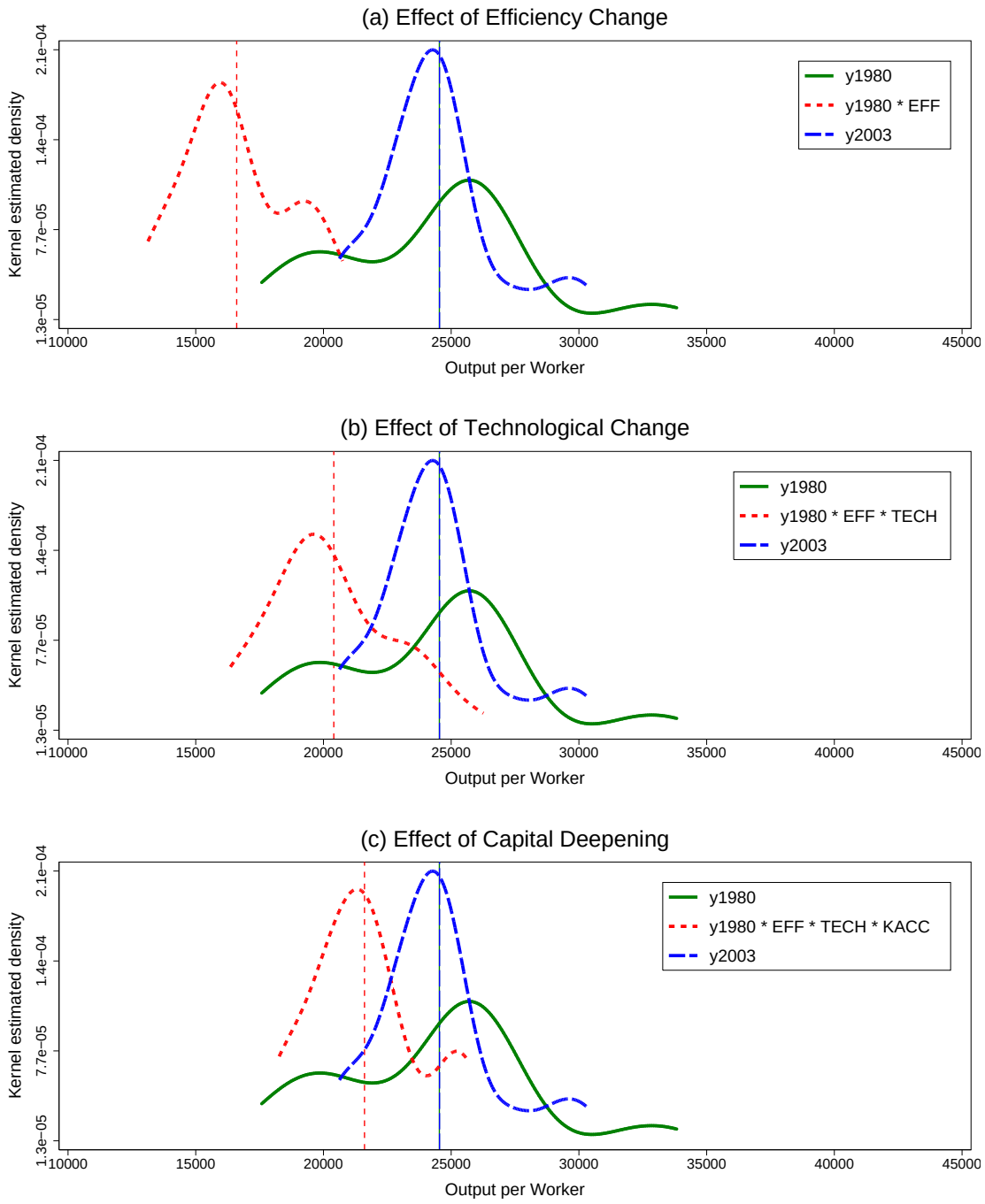

Figure 68: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

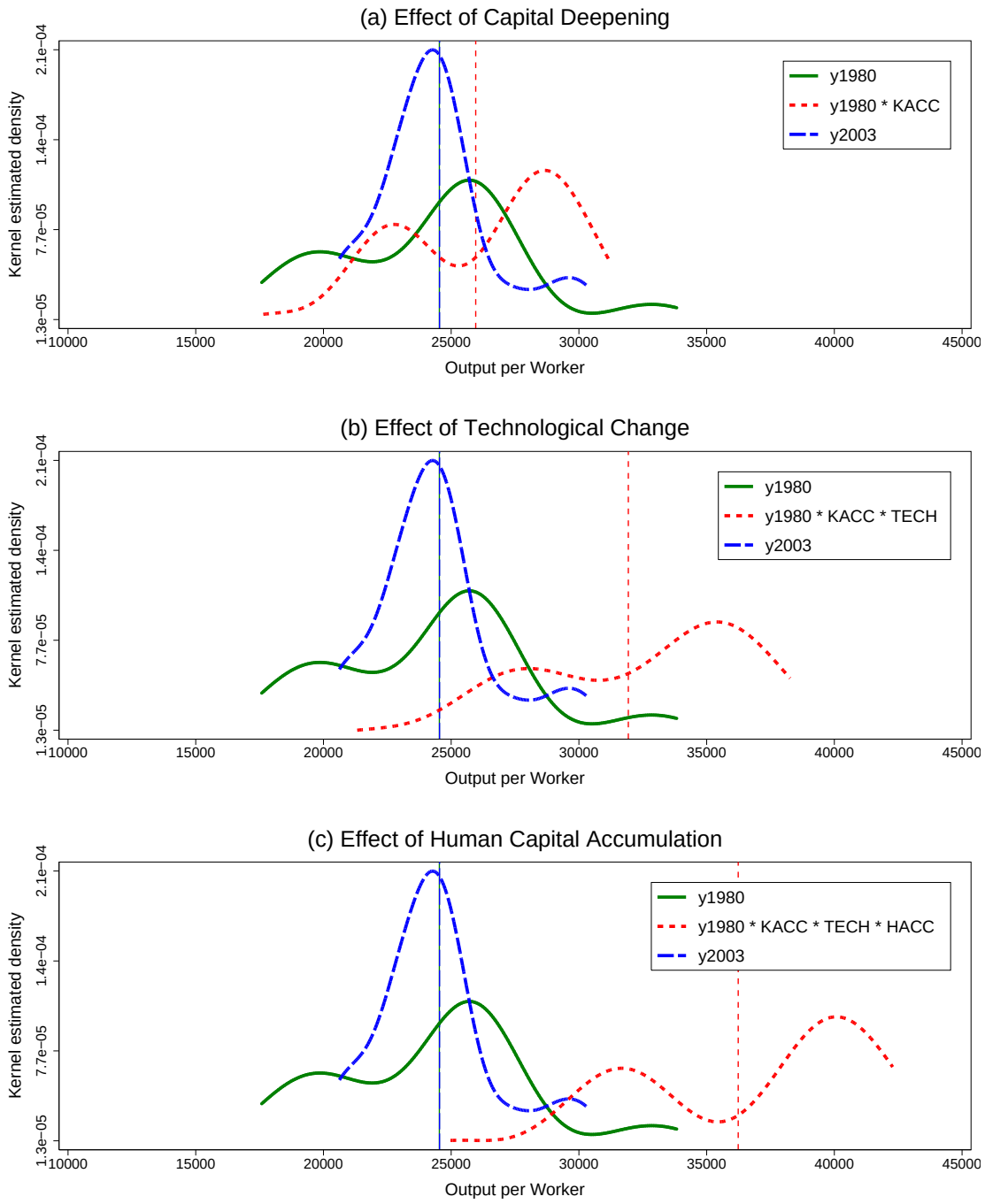

Figure 69: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

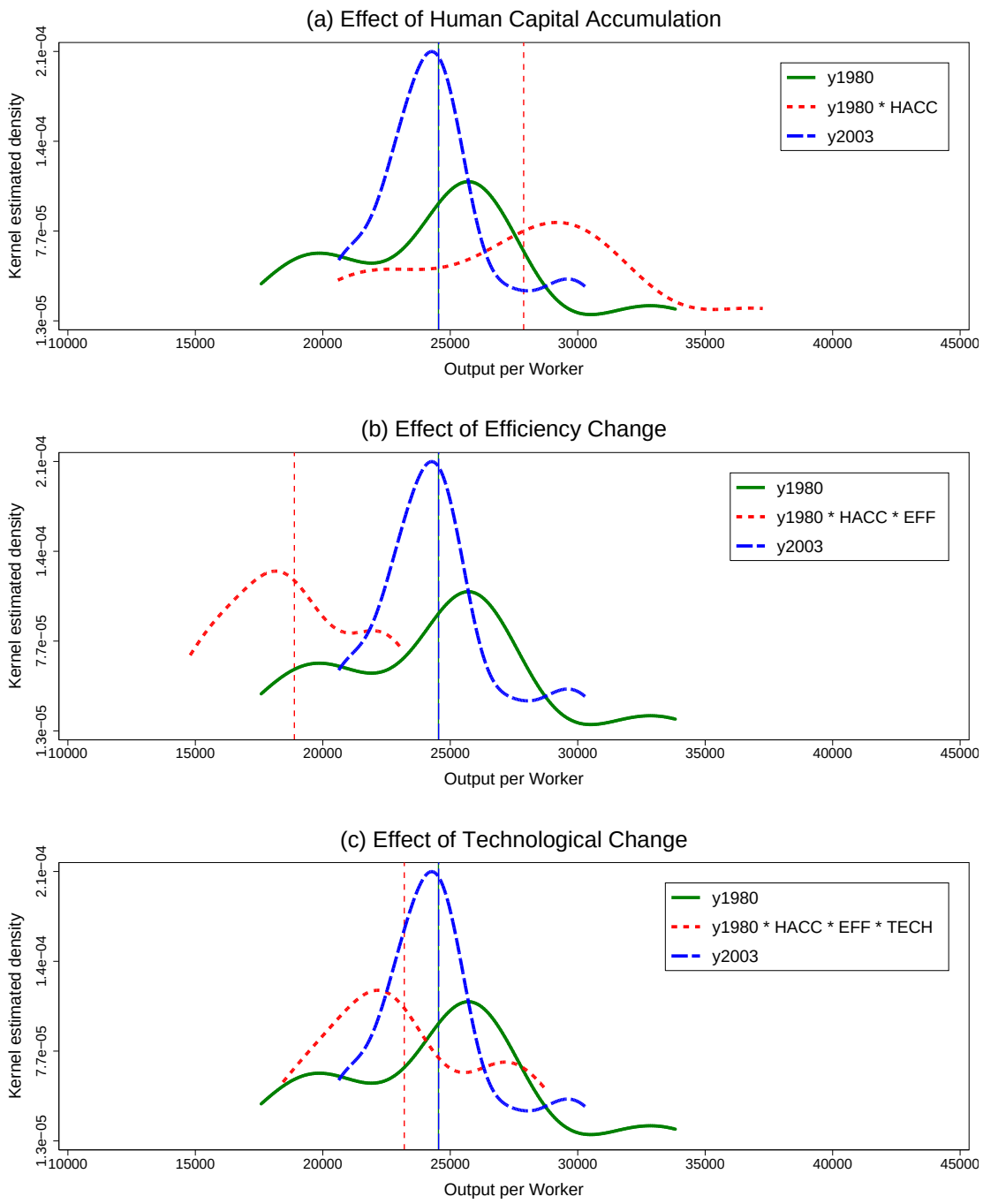

Figure 70: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 22: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1980})$	0.0500
2	$g(y_{2003})$ vs. $f(y_{1980} \times EFF)$	0.0000
3	$g(y_{2003})$ vs. $f(y_{1980} \times TECH)$	0.0040
4	$g(y_{2003})$ vs. $f(y_{1980} \times KACC)$	0.0136
5	$g(y_{2003})$ vs. $f(y_{1980} \times HACC)$	0.0118
6	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.0016
7	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0000
8	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0002
9	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.0000
10	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.0000
11	$g(y_{2003})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.0032
12	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.0224
13	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.0322
14	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0006
15	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.0002

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

13 Construction sector: 1980−1994, output is GVA

13.1 Production function

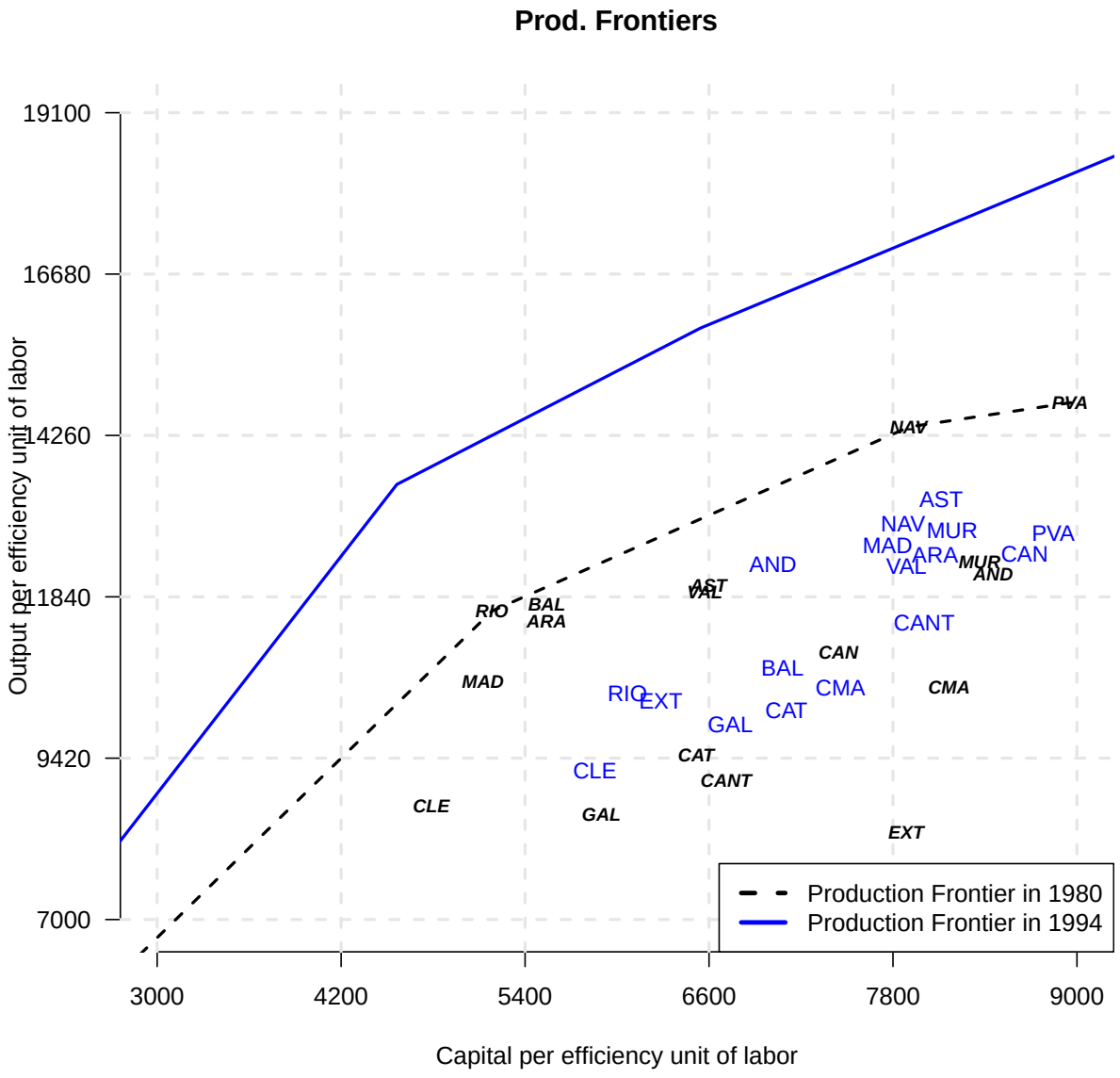

Figure 71: Production frontiers in 1980 and 1994

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 1994 observations. The dotted line represents the 1980 production frontier and the solid line presents the 1994 production frontier.

13.2 Table with decomposition results

Table 23: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−1994

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.84	0.76	21.48	-9.63	21.2	-0.1	11.03
2	Aragon	0.96	0.72	26.64	-24.81	21.21	24.52	11.59
3	Asturias	0.92	0.77	28.34	-16.72	21.01	14.9	10.85
4	Balearic Islands	0.98	0.66	13.44	-32.77	21.68	22.77	12.96
5	Basque Country	0.79	0.7	35.34	-11.79	21.15	10.57	14.52
6	Canary Islands	0.69	0.66	51.22	-3.8	20.67	14.49	13.78
7	Cantabria	0.81	0.61	28.29	-24.35	25.34	27.27	6.31
8	Castilla-La Mancha	0.72	0.63	18.78	-13.48	20.23	2.52	11.38
9	Castilla y Leon	0.73	0.62	27.99	-15.18	21.43	12.43	10.53
10	Catalonia	0.91	0.72	23.97	-21.48	20.64	15.25	13.54
11	Extremadura	0.58	0.66	45.66	14.3	20.74	-3.17	9
12	Galicia	0.69	0.62	34.88	-11.02	21.95	14.94	8.14
13	Madrid	0.92	0.74	40.62	-19.56	21.5	30.29	10.43
14	Murcia	0.85	0.74	23.21	-13.35	20.71	3.98	13.28
15	Navarra	1	0.75	10.36	-24.52	19.36	5.63	15.96
16	Rioja	1	0.71	-1.06	-29.16	23.02	2.73	10.53
17	Valencian Community	1	0.68	8.84	-32.05	22.44	20.18	8.84
	average	0.85	0.69	25.76	-17.02	21.43	12.89	11.33
	weighted average	0.85	0.7	26.91	-16.55	21.3	13.41	11.26

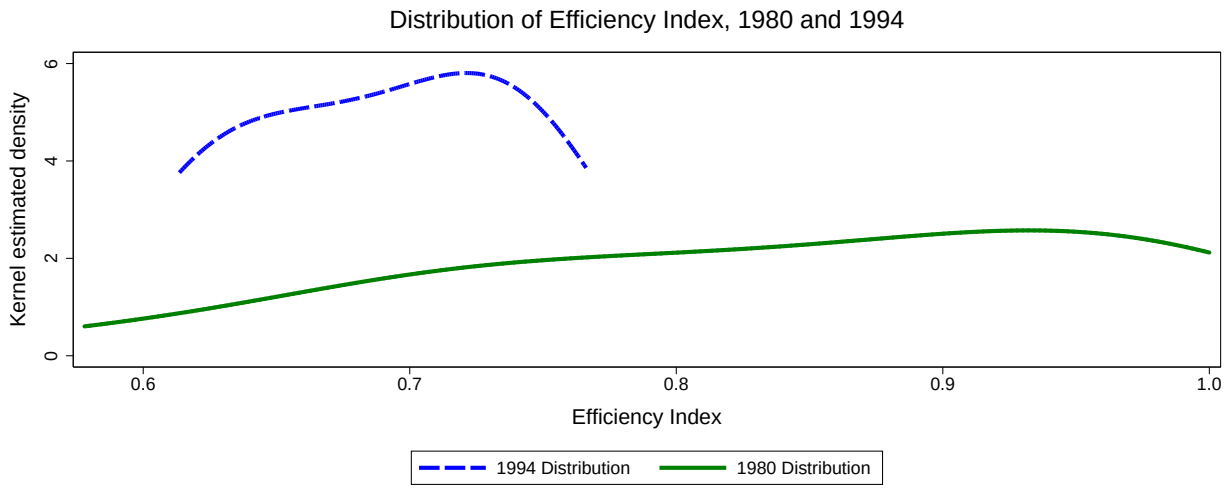

Figure 72: Distributions of efficiency scores in 1980 and 1994

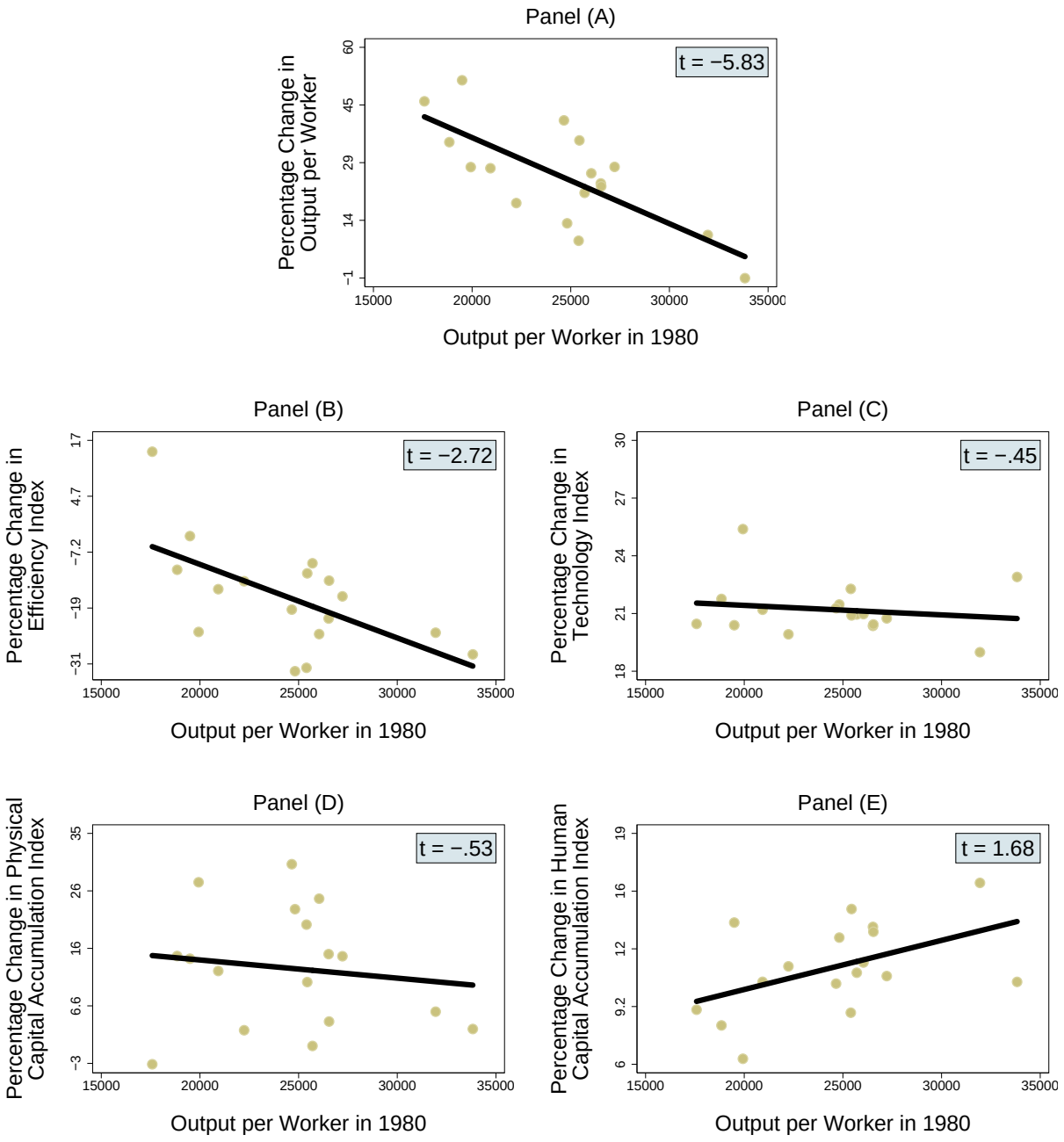

Figure 73: Percentage change (from 1980 to 1994) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

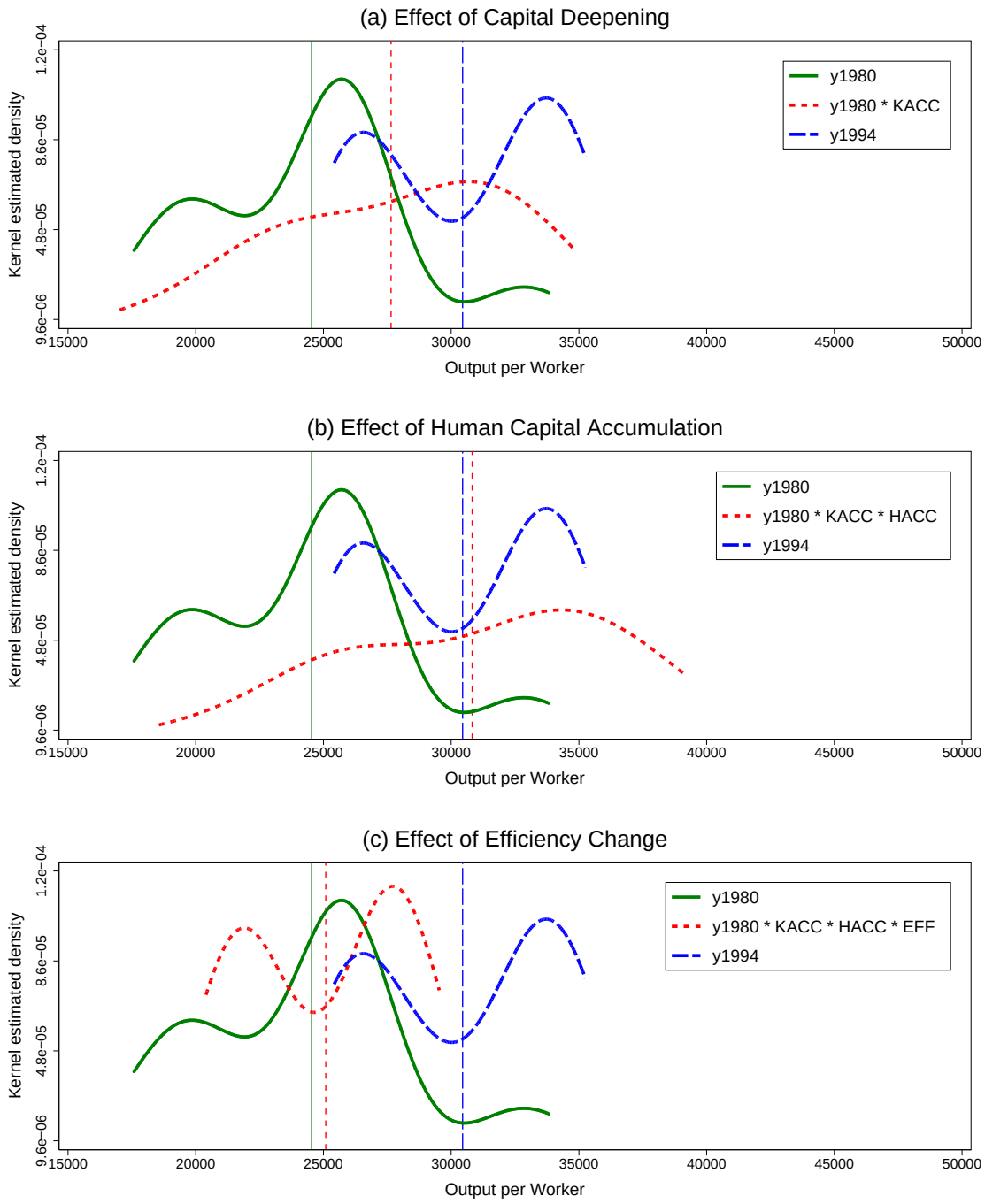

Figure 74: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

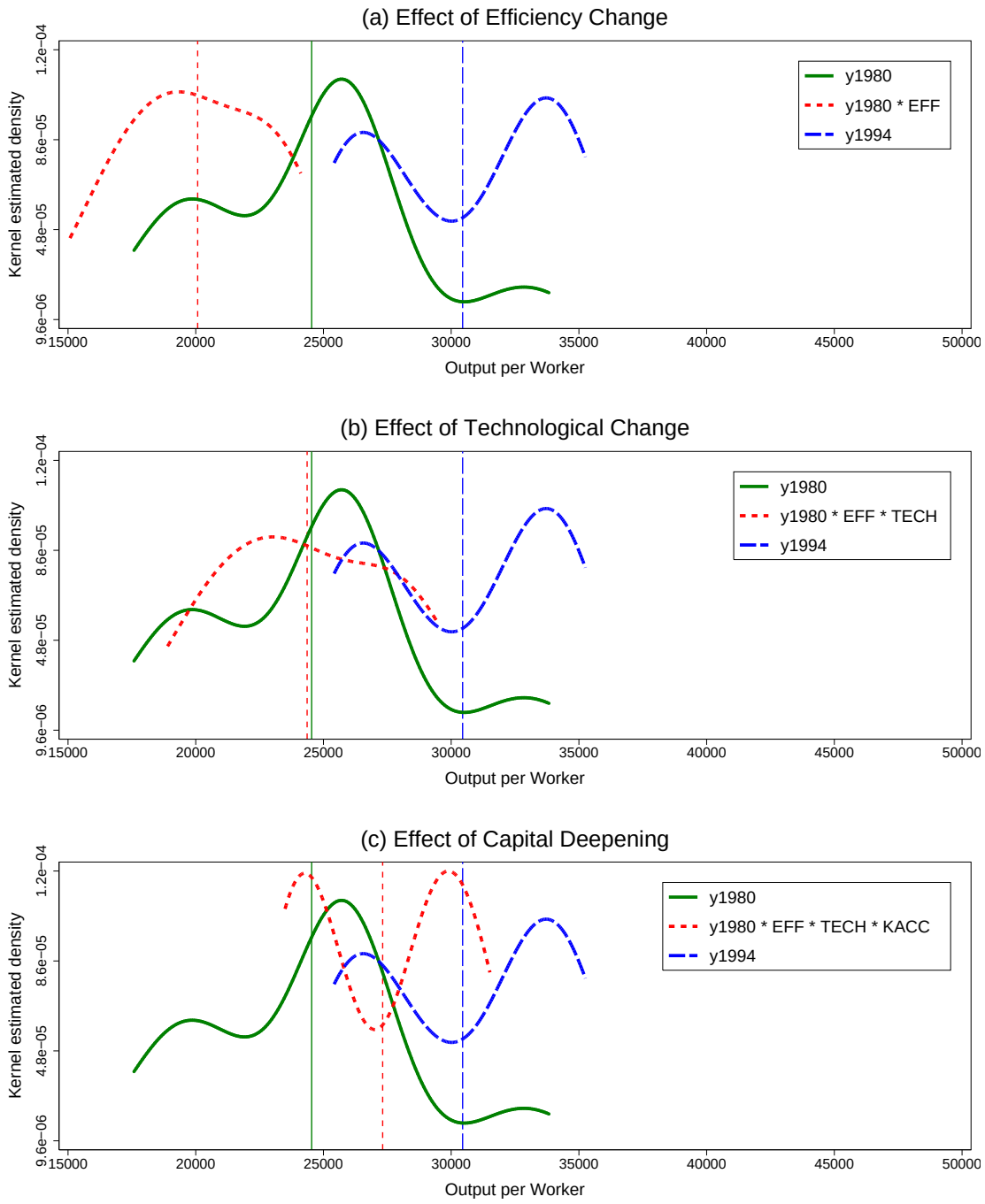

Figure 75: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

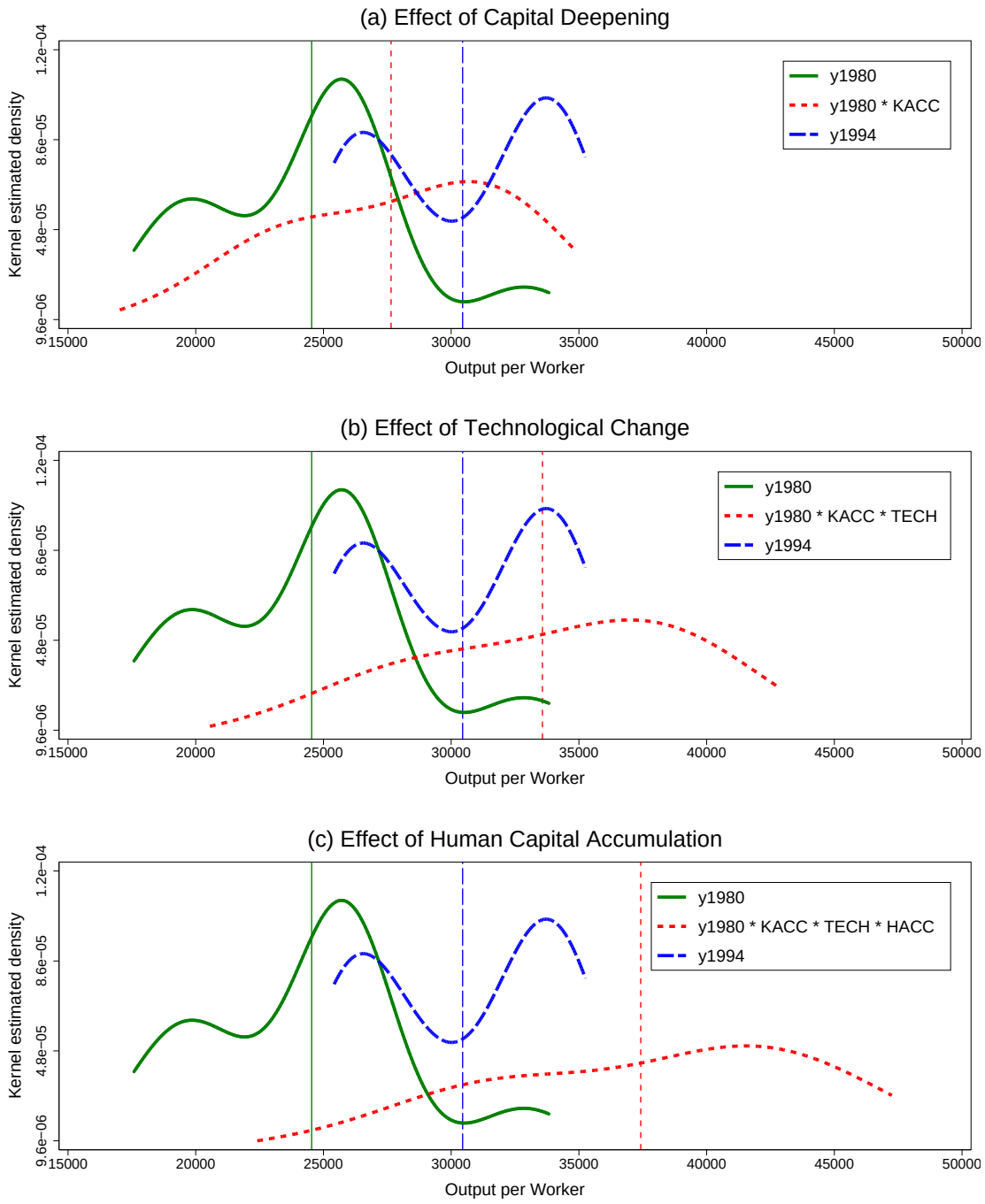

Figure 76: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

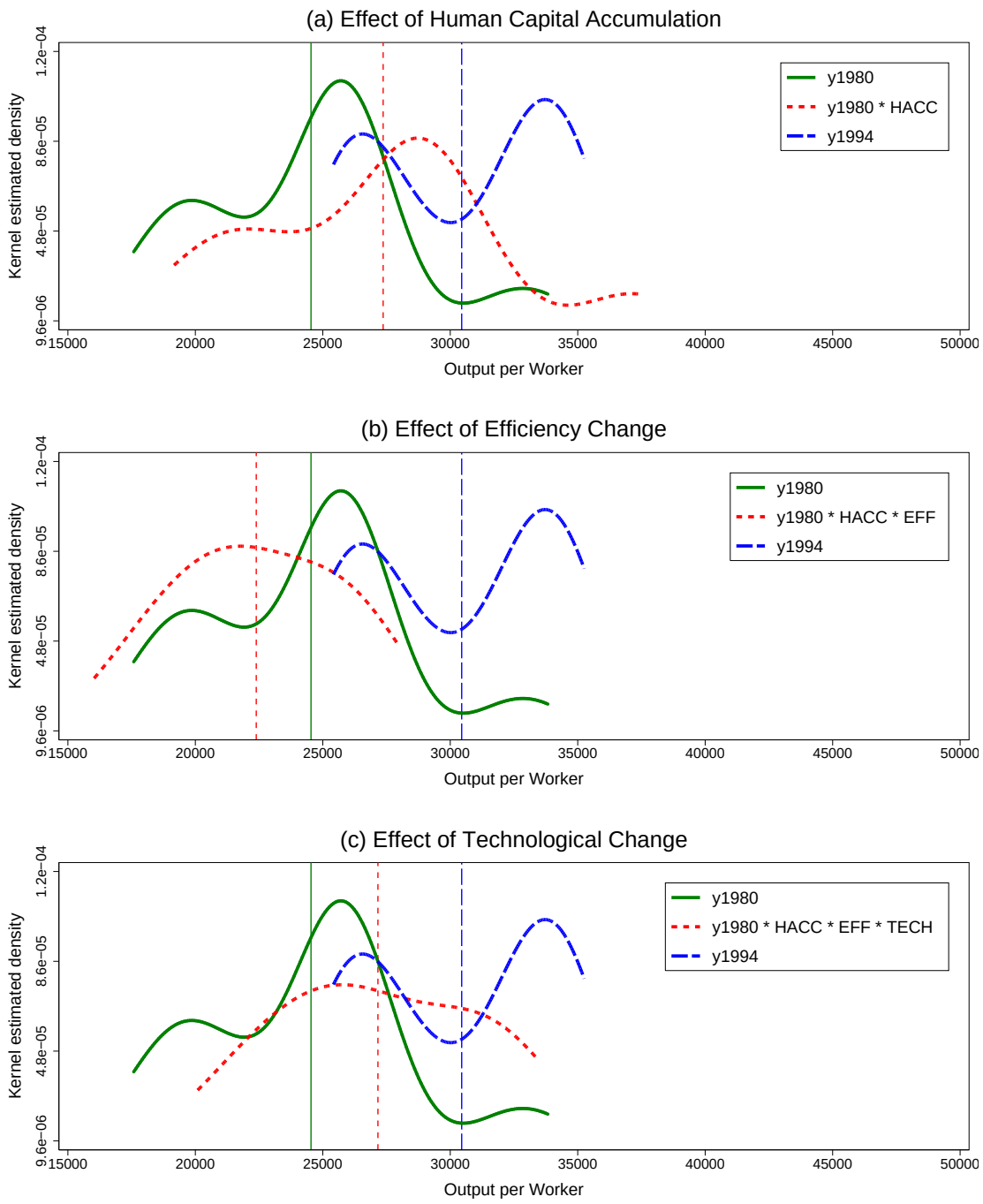

Figure 77: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 24: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{1994})$ vs. $f(y_{1980})$	0.0304
2	$g(y_{1994})$ vs. $f(y_{1980} \times EFF)$	0.0000
3	$g(y_{1994})$ vs. $f(y_{1980} \times TECH)$	0.0216
4	$g(y_{1994})$ vs. $f(y_{1980} \times KACC)$	0.2144
5	$g(y_{1994})$ vs. $f(y_{1980} \times HACC)$	0.0062
6	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.0018
7	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0000
8	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0010
9	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.0314
10	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.7554
11	$g(y_{1994})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.7626
12	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.0054
13	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.1234
14	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0056
15	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.0040

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

14 Construction sector: 1995−2003, output is GVA

14.1 Production function

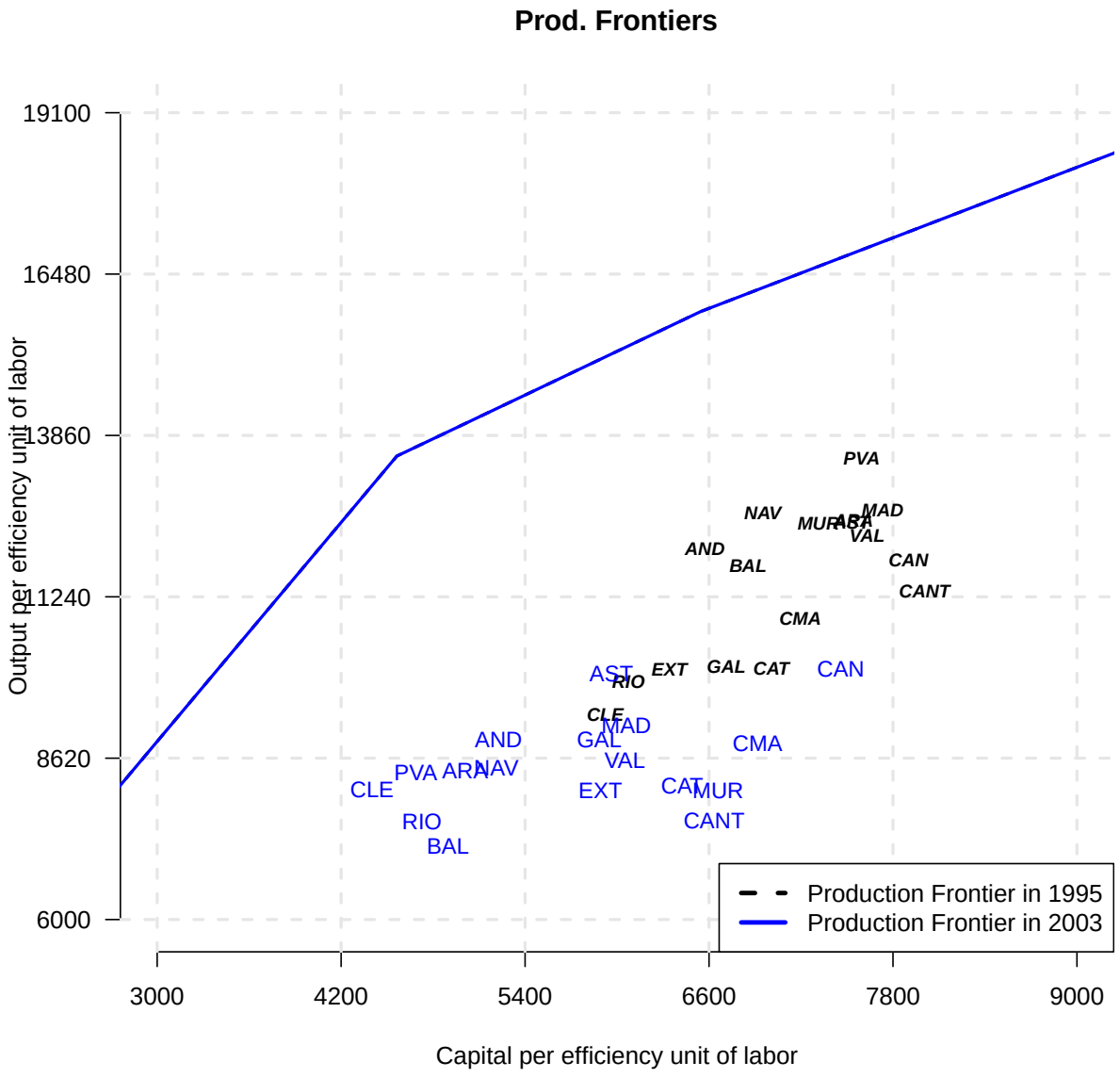

Figure 78: Production frontiers in 1995 and 2003

Notes: The bold italic abbreviations show the 1995 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1995 production frontier and the solid line presents the 2003 production frontier.

14.2 Table with decomposition results

Table 25: Efficiency scores and percentage change of quadripartite decomposition indexes, 1995−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.76	0.62	-21.8	-17.5	0	-7.8	2.9
2	Aragon	0.74	0.6	-25.4	-19.2	0	-12.8	6.0
3	Asturias	0.74	0.66	-15.4	-11.1	0	-7.6	2.9
4	Balearic Islands	0.73	0.52	-33.2	-28.7	0	-10.7	4.9
5	Basque Country	0.69	0.6	-11.5	-12.8	0	-0.7	2.3
6	Canary Islands	0.66	0.48	-27.8	-27.4	0	-4.7	4.4
7	Cantabria	0.62	0.62	-6.1	0.9	0	-10.0	3.3
8	Castilla-La Mancha	0.66	0.55	-13.0	-17.2	0	1.1	3.9
9	Castilla y Leon	0.62	0.52	-12.6	-15.9	0	-0.5	4.5
10	Catalonia	0.72	0.56	-25.0	-22.4	0	-6.8	3.8
11	Extremadura	0.64	0.54	-9.2	-16.6	0	2.2	6.7
12	Galicia	0.63	0.59	0.0	-6.3	0	-0.3	7.0
13	Madrid	0.74	0.6	-21.9	-19.5	0	-6.9	4.2
14	Murcia	0.75	0.51	-30.4	-32.3	0	-1.1	4.0
15	Navarra	0.78	0.59	-29.0	-23.6	0	-10.0	3.3
16	Rioja	0.8	0.61	-33.1	-23.2	0	-16.4	4.4
17	Valencian Community	0.64	0.55	-16.0	-14.0	0	-6.9	5.0
	average	0.7	0.57	-19.5	-18.1	0	-5.9	4.3
	weighted average	0.7	0.58	-19.2	-18.0	0	-5.5	4.2

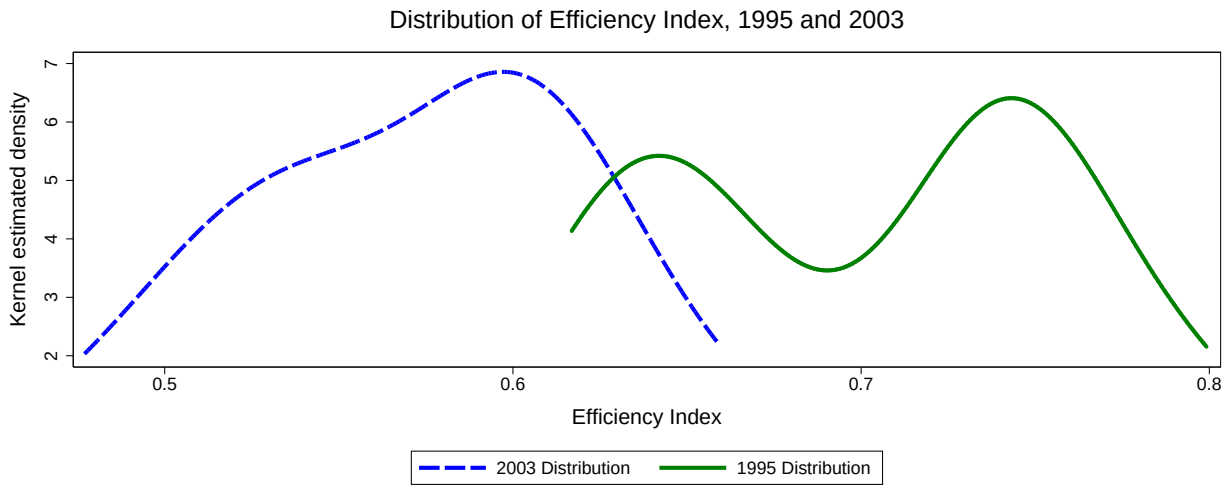

Figure 79: Distributions of efficiency scores in 1995 and 2003

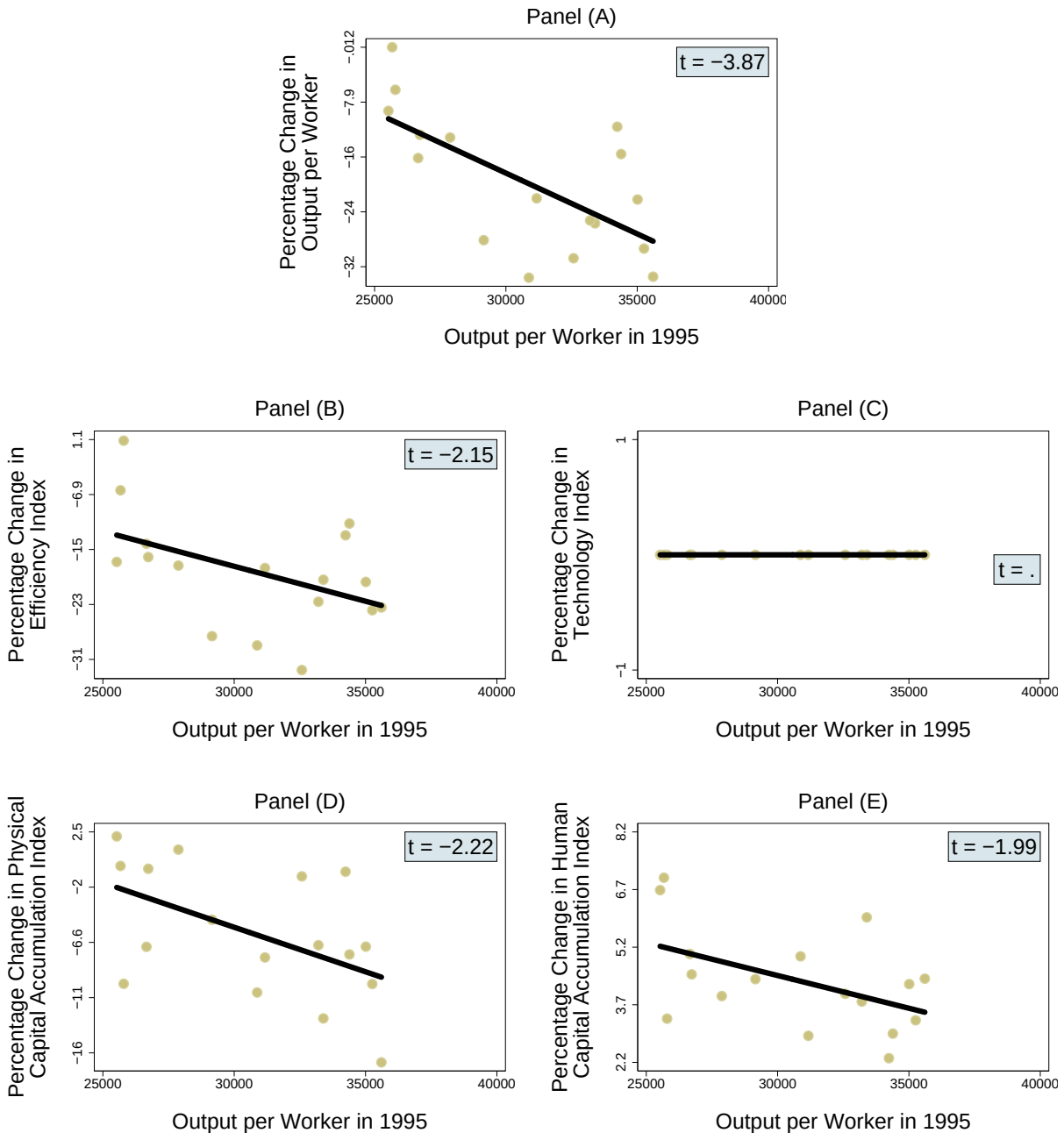

Figure 80: Percentage change (from 1995 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1995

Note: Each panel contains a GLS regression line.

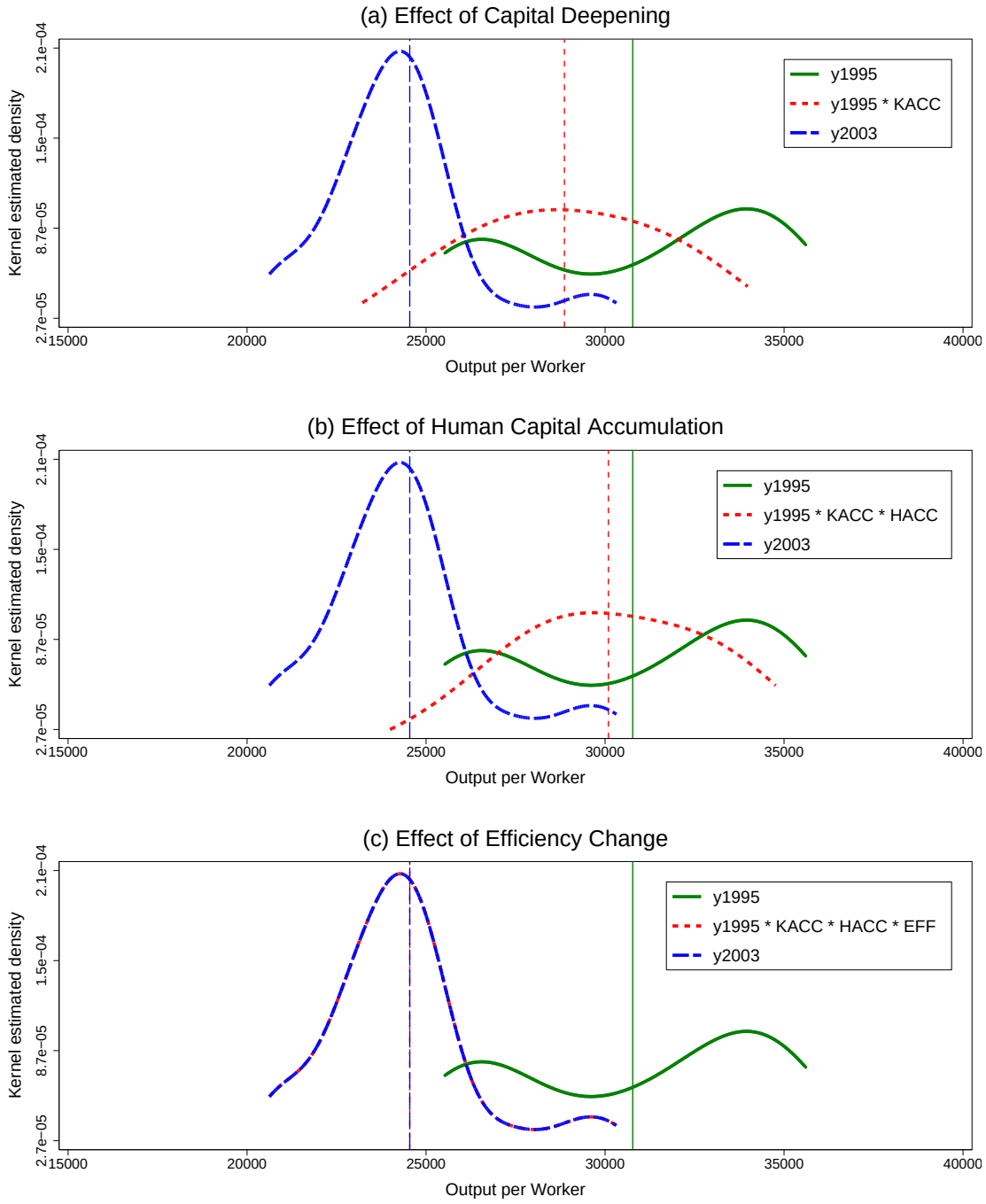

Figure 81: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1995 distribution.

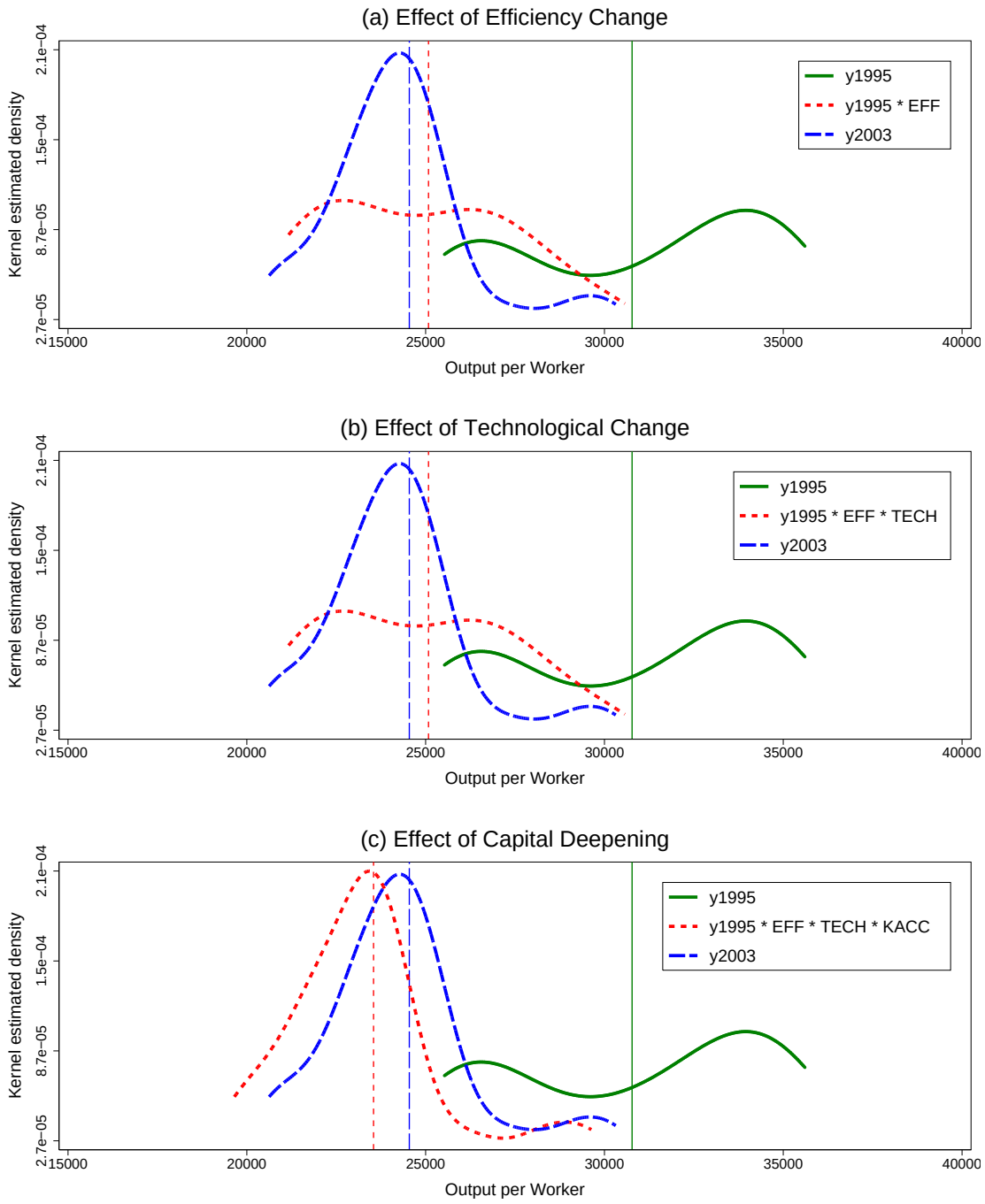

Figure 82: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1995 distribution.

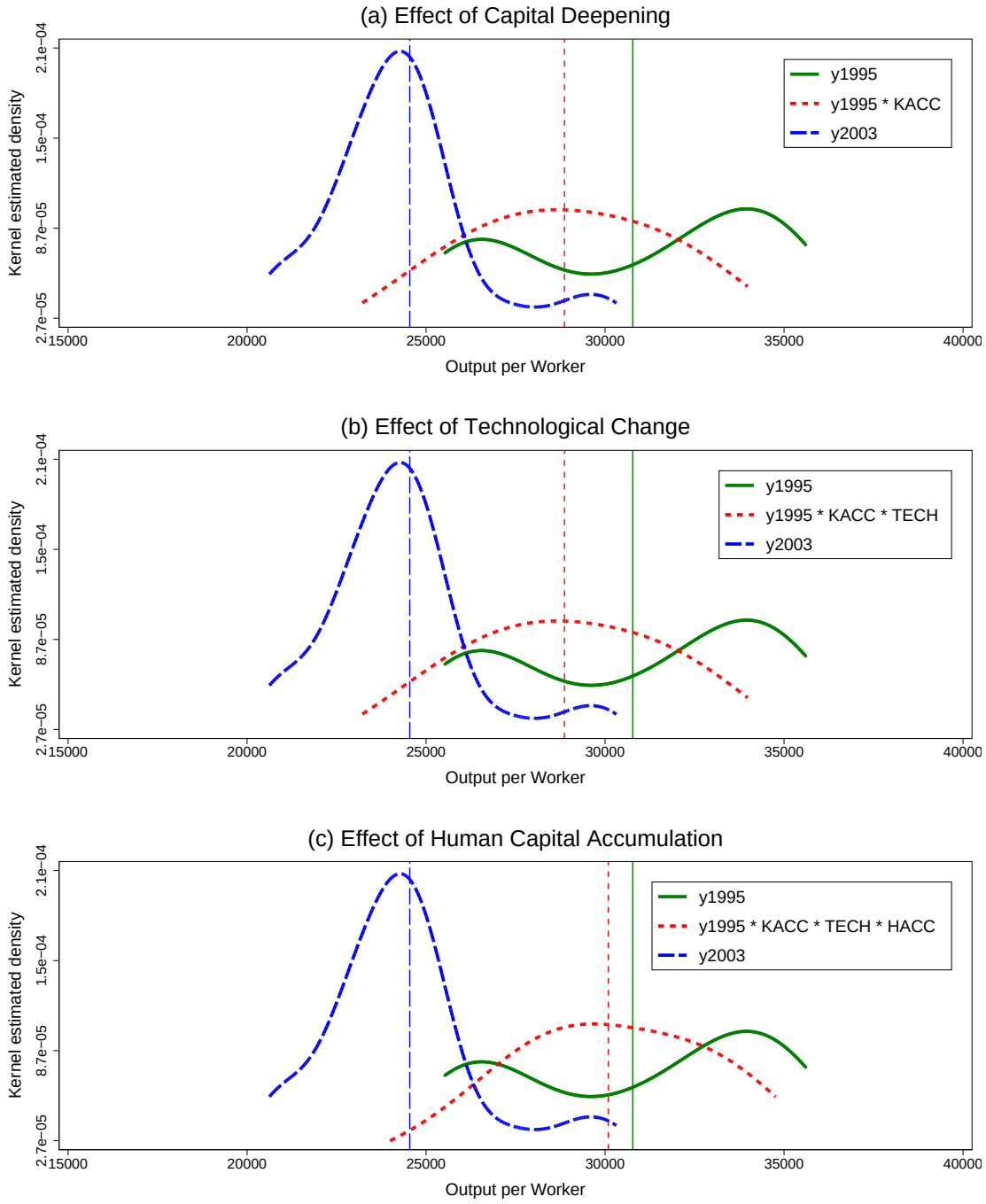

Figure 83: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1995 distribution.

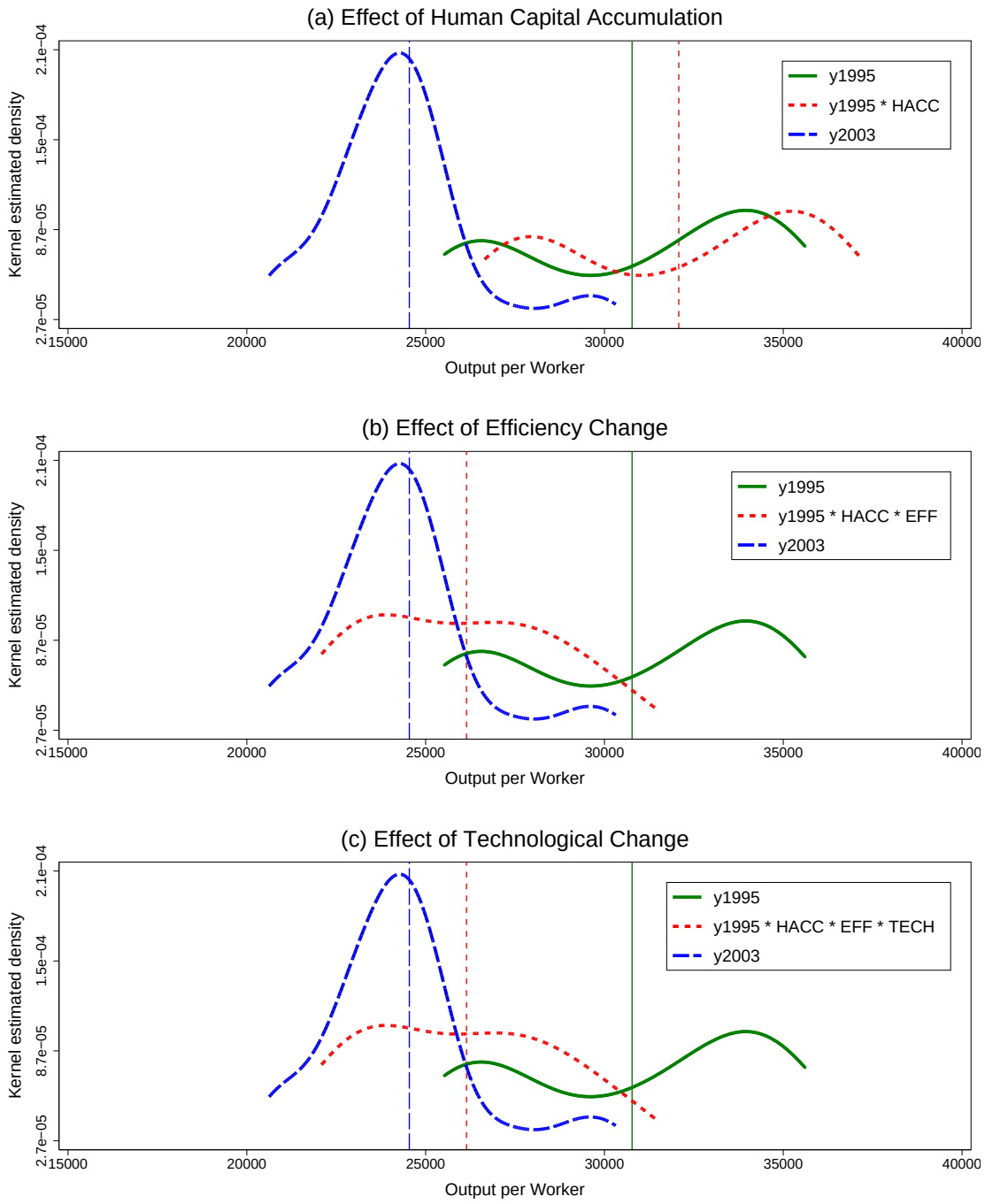

Figure 84: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1995 distribution.

Table 26: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1995})$	0.0006
2	$g(y_{2003})$ vs. $f(y_{1995} \times EFF)$	0.0680
3	$g(y_{2003})$ vs. $f(y_{1995} \times TECH)$	0.0000
4	$g(y_{2003})$ vs. $f(y_{1995} \times KACC)$	0.0034
5	$g(y_{2003})$ vs. $f(y_{1995} \times HACC)$	0.0000
6	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH)$	0.0730
7	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC)$	0.6794
8	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times HACC)$	0.1842
9	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC)$	0.0052
10	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times HACC)$	0.0000
11	$g(y_{2003})$ vs. $f(y_{1995} \times KACC \times HACC)$	0.0008
12	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times KACC)$	0.6844
13	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times HACC)$	0.1788
14	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC \times HACC)$	1.0000
15	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC \times HACC)$	0.0002

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

15 Energy sector: 1980−2003, output is GVA

15.1 Production function

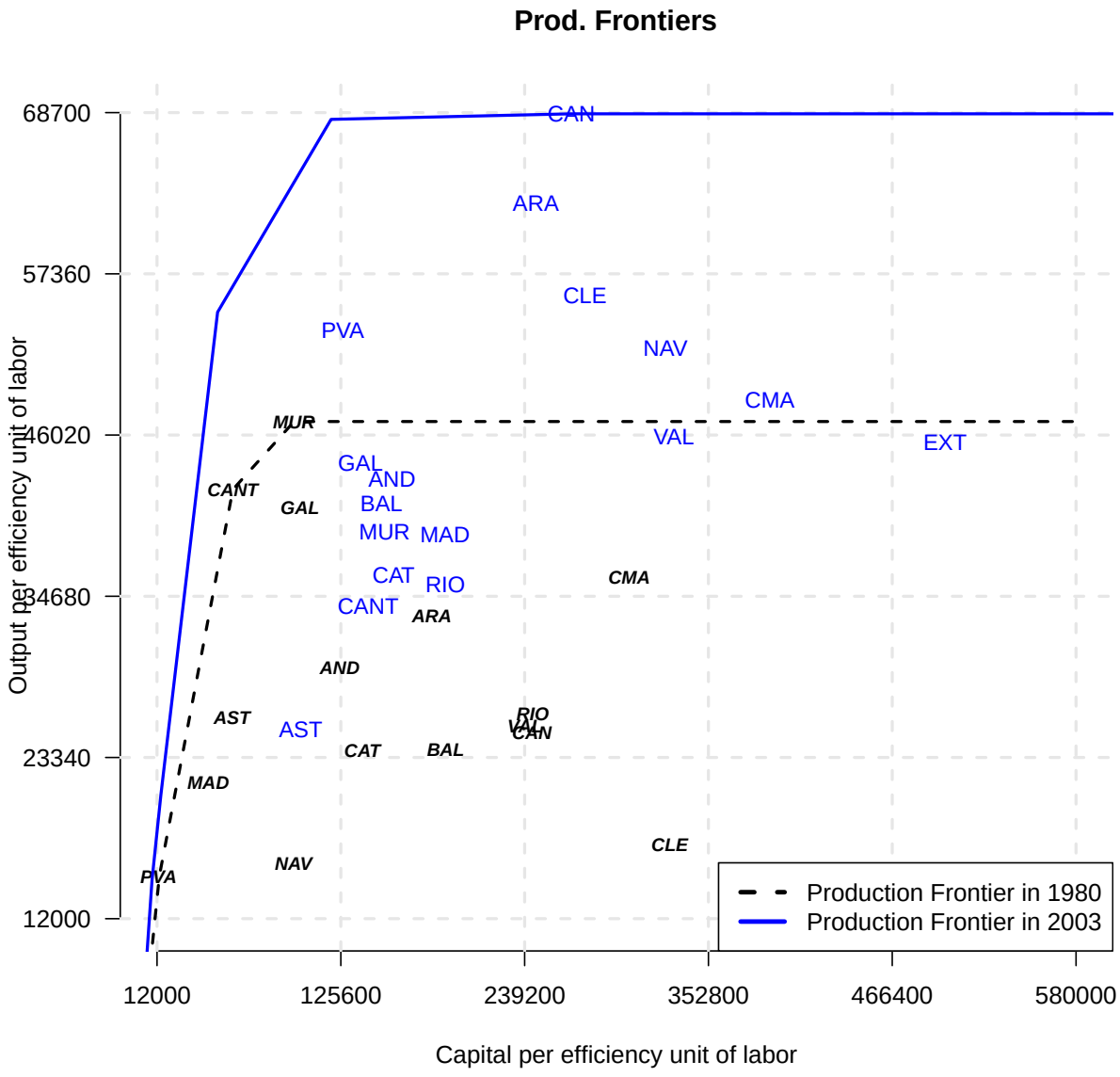

Figure 85: Production frontiers in 1980 and 2003

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1980 production frontier and the solid line presents the 2003 production frontier.

15.2 Table with decomposition results

Table 27: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.63	0.63	76.5	-0.4	45.4	2.6	18.8
2	Aragon	0.71	0.91	162.5	28.1	45.8	0.2	40.3
3	Asturias	0.62	0.39	43.2	-37.0	36.0	26.6	32.1
4	Balearic Islands	0.51	0.6	142.8	18.5	45.5	0.0	40.7
5	Basque Country	0.53	1	205.3	87.1	46.0	0.1	11.7
6	Canary Islands	1	0.5	5.0	-50.2	39.5	22.6	23.2
7	Cantabria	0.37	0.81	276.8	122.0	46.1	0.0	16.2
8	Castilla-La Mancha	0.77	0.71	95.0	-7.8	46.1	0.1	44.7
9	Castilla y Leon	0.51	0.53	110.6	4.4	45.4	2.9	34.8
10	Catalonia	0.54	0.67	116.1	23.0	46.0	0.1	20.2
11	Extremadura	0.27	0.66	476.9	146.2	46.1	0.0	60.4
12	Galicia	0.87	0.65	49.0	-25.9	41.3	7.4	32.4
13	Madrid	0.65	0.57	150.0	-12.5	47.0	61.2	20.5
14	Murcia	1	0.57	12.5	-42.5	40.6	7.6	29.4
15	Navarra	0.34	0.76	405.4	124.4	40.9	9.5	46.0
16	Rioja	1	0.78	309.7	-21.8	38.1	247.1	9.3
17	Valencian Community	0.56	0.52	82.1	-7.6	45.8	0.0	35.2
	average	0.64	0.66	160.0	20.5	43.6	22.8	30.3
	weighted average	0.63	0.63	117.6	7.4	44.8	13.1	26.8

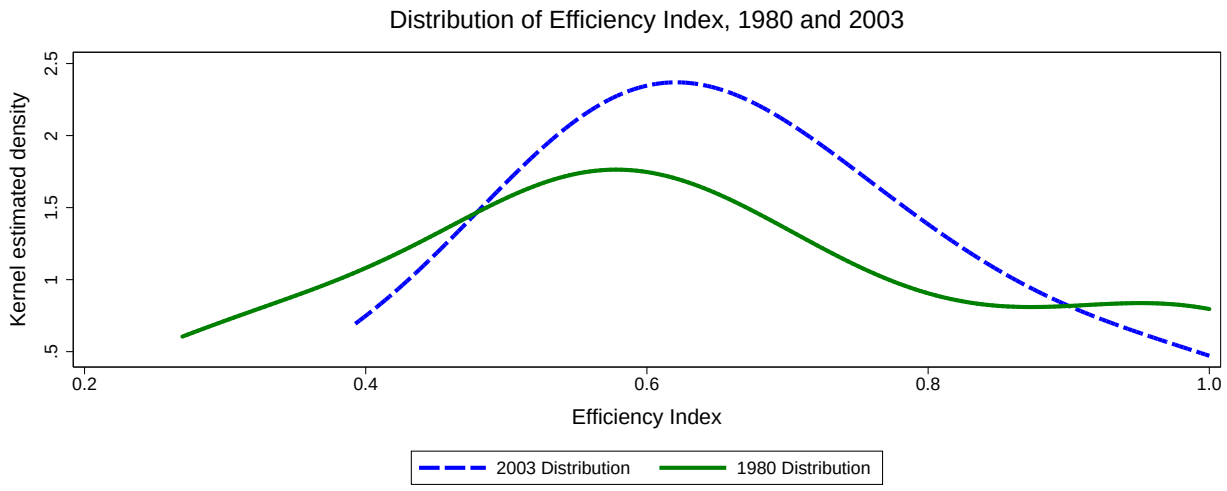

Figure 86: Distributions of efficiency scores in 1980 and 2003

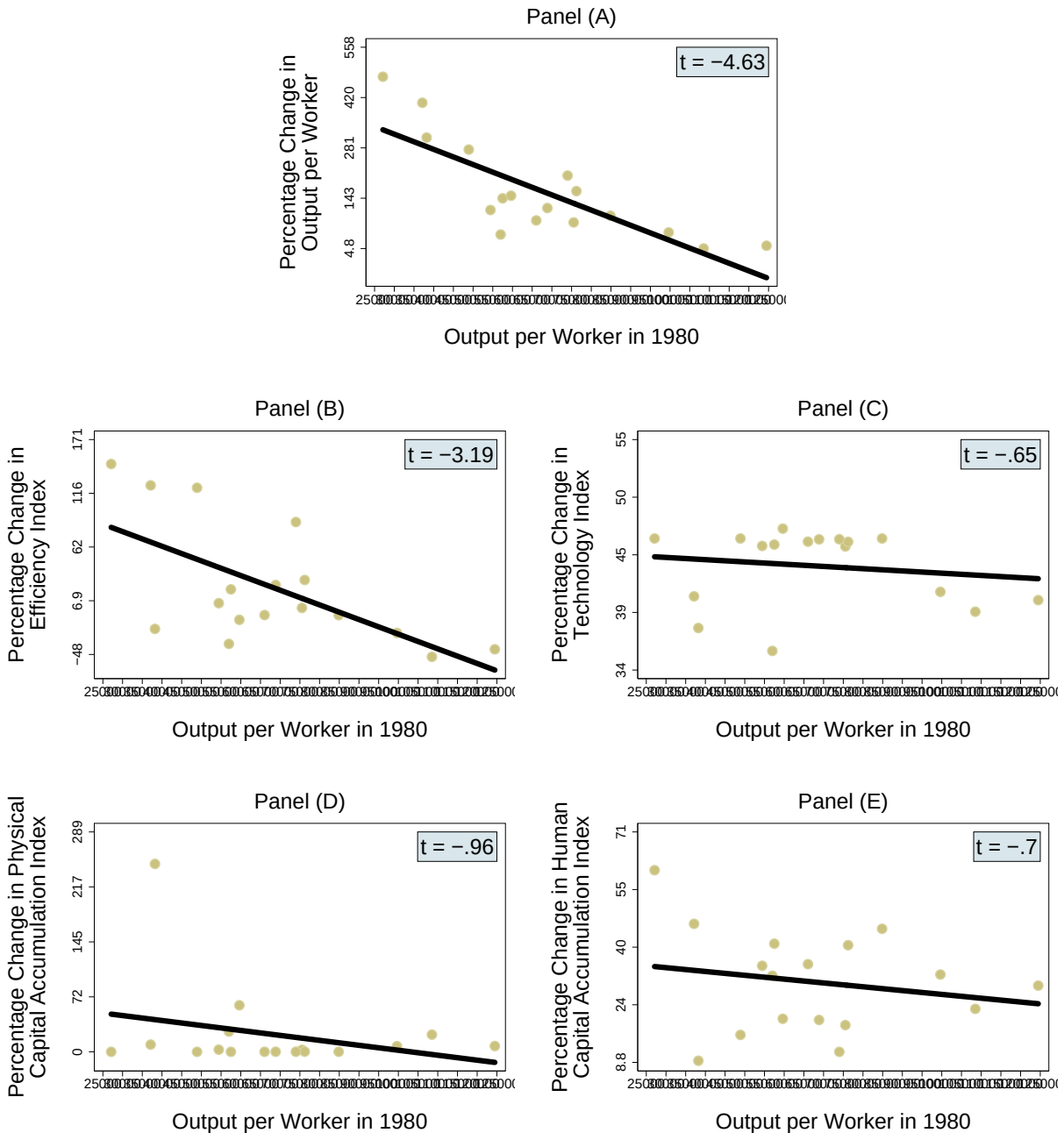

Figure 87: Percentage change (from 1980 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

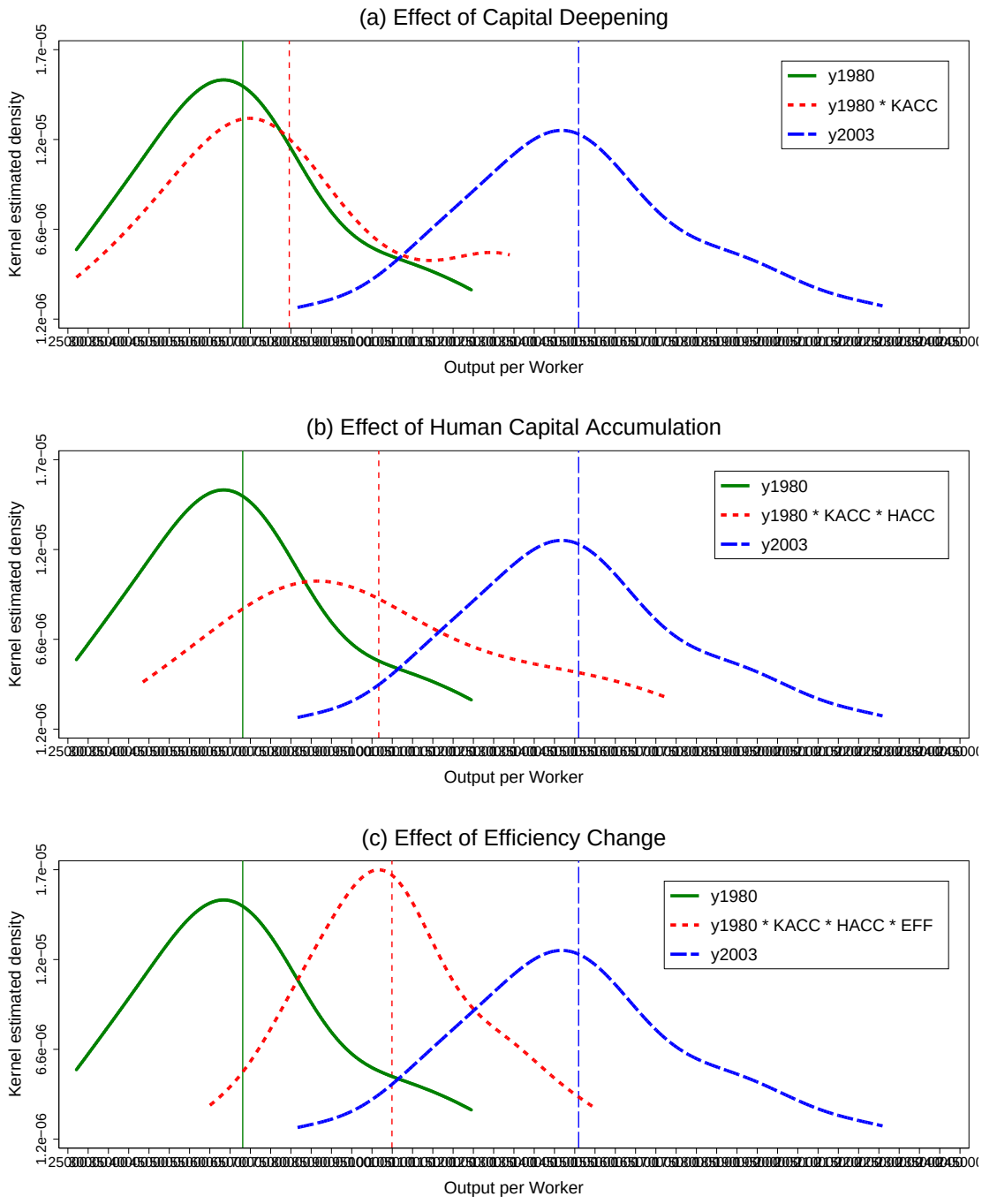

Figure 88: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

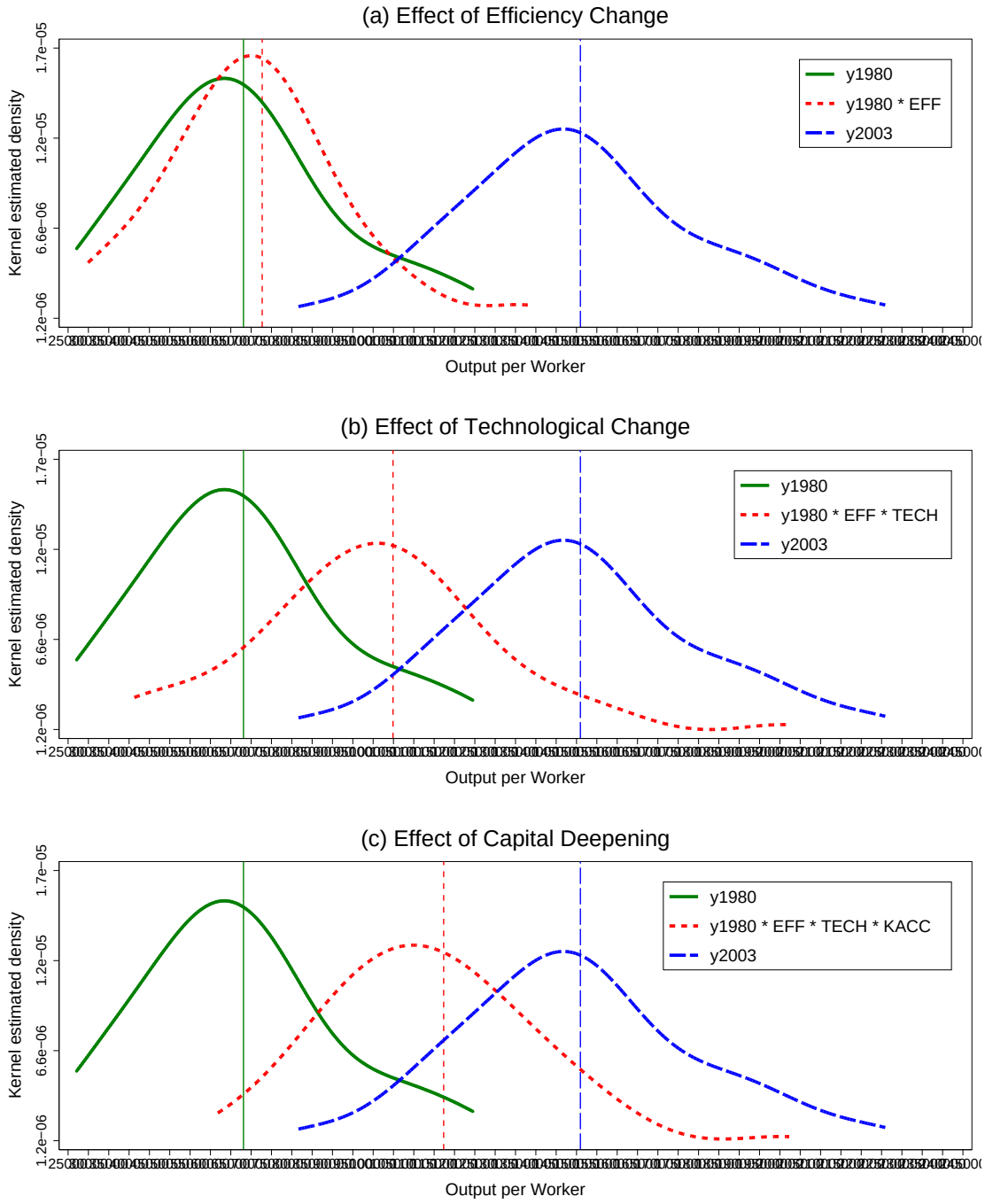

Figure 89: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

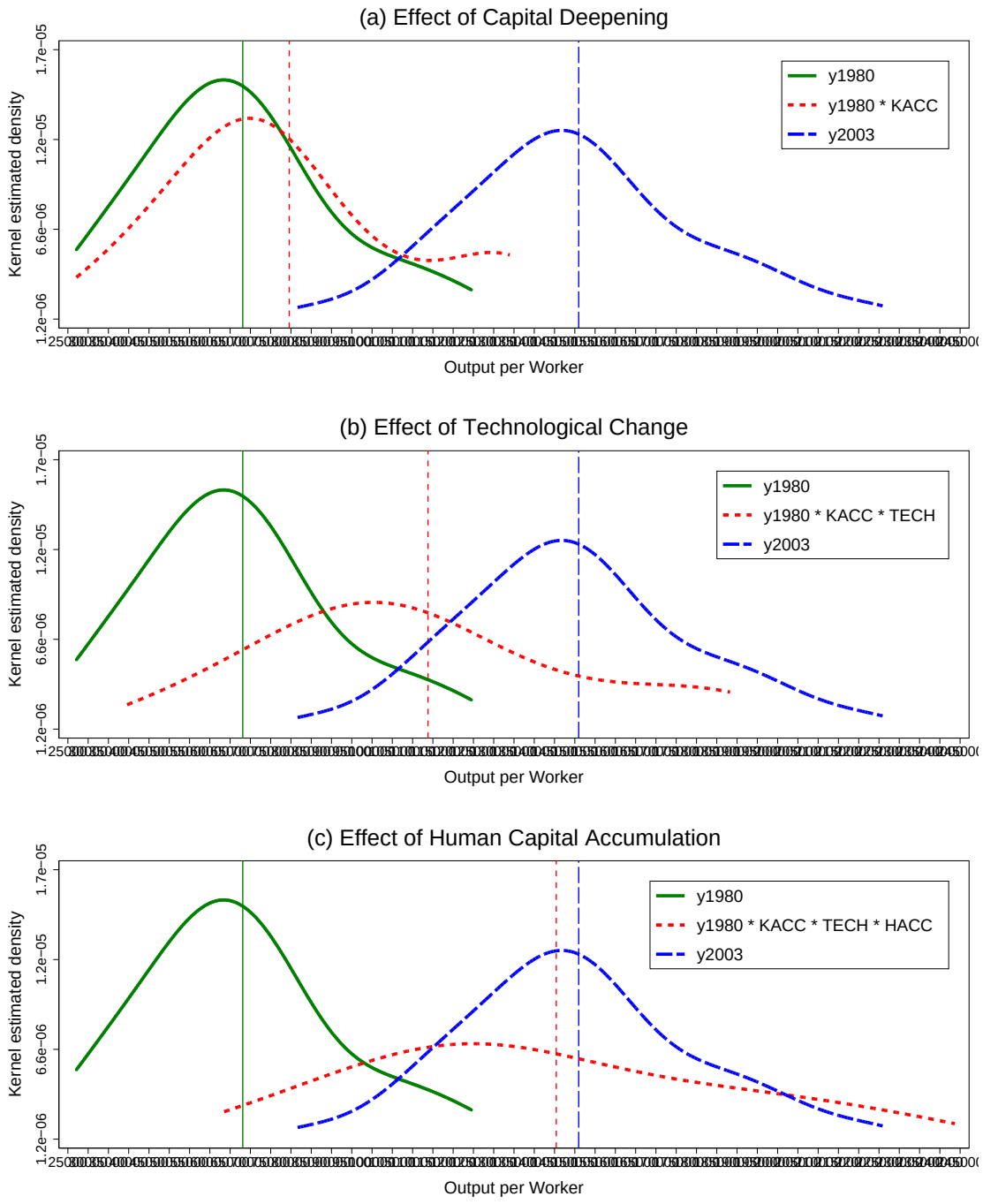

Figure 90: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

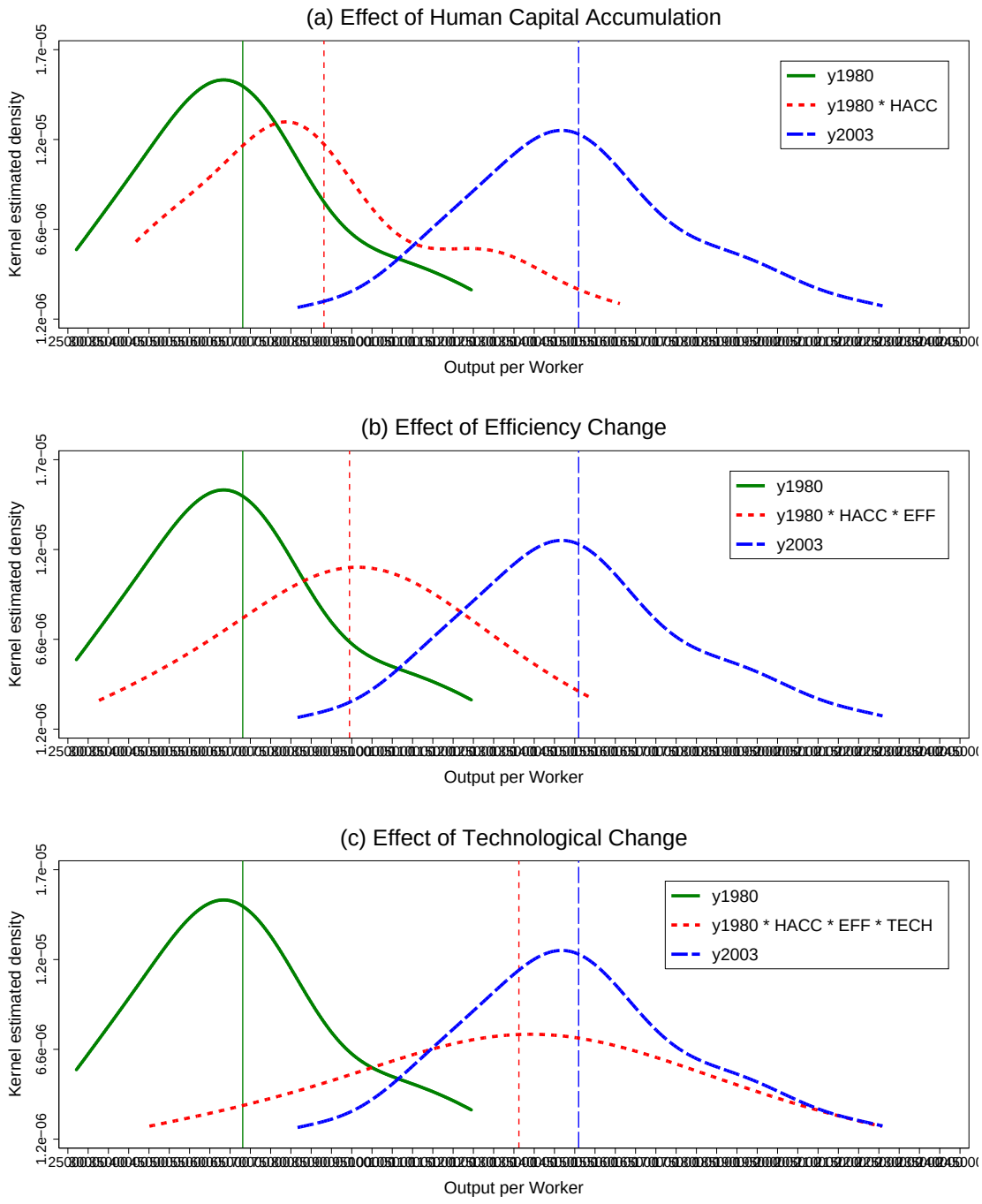

Figure 91: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 28: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1980})$	0.0000
2	$g(y_{2003})$ vs. $f(y_{1980} \times EFF)$	0.0000
3	$g(y_{2003})$ vs. $f(y_{1980} \times TECH)$	0.0066
4	$g(y_{2003})$ vs. $f(y_{1980} \times KACC)$	0.0002
5	$g(y_{2003})$ vs. $f(y_{1980} \times HACC)$	0.0010
6	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.0088
7	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0000
8	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0050
9	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.0300
10	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.0880
11	$g(y_{2003})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.0114
12	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.0390
13	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.8398
14	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0052
15	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.7608

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

16 Energy sector: 1980−1994, output is GVA

16.1 Production function

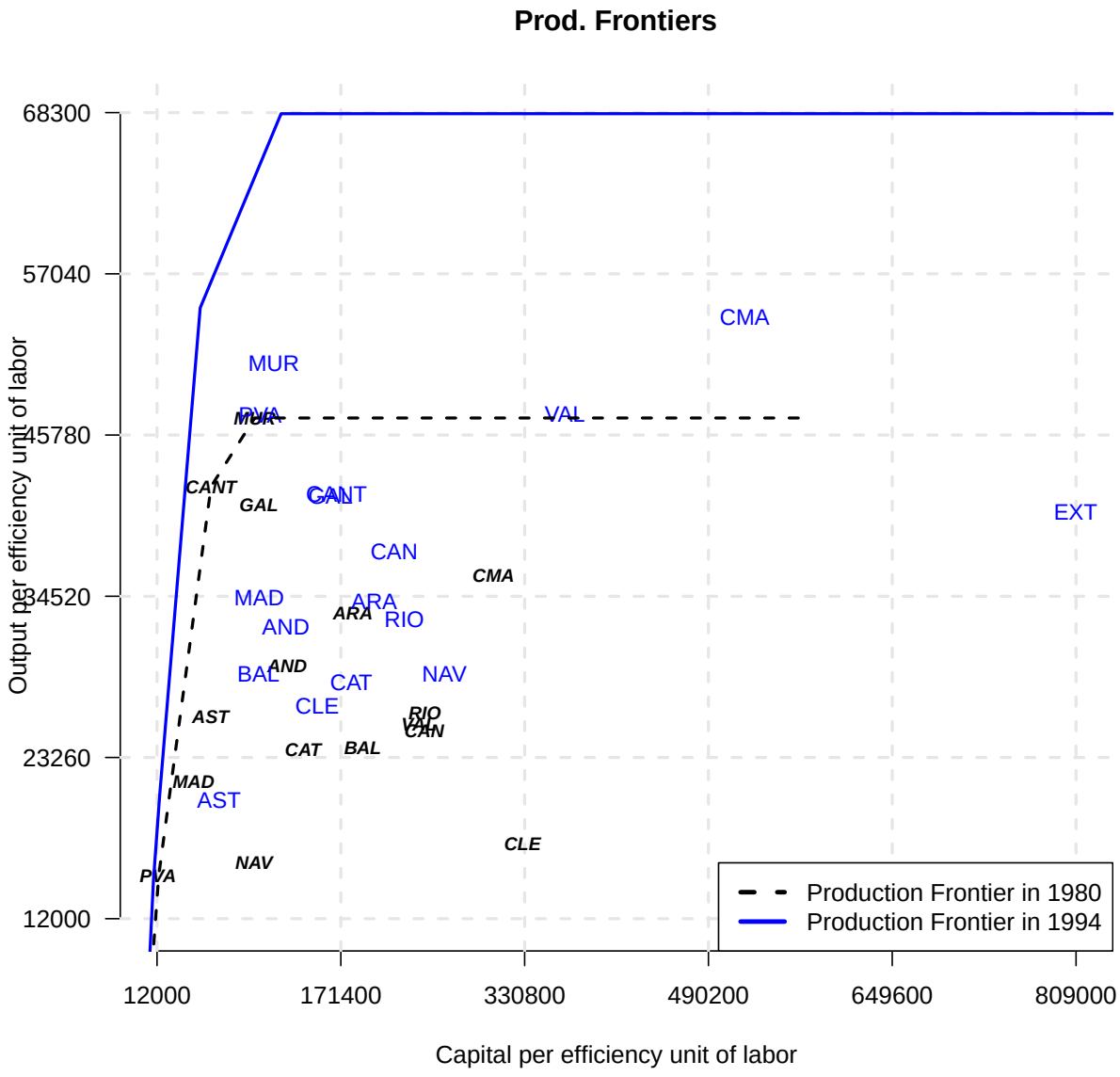

Figure 92: Production frontiers in 1980 and 1994

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 1994 observations. The dotted line represents the 1980 production frontier and the solid line presents the 1994 production frontier.

16.2 Table with decomposition results

Table 29: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−1994

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.63	0.47	25.6	-24.8	45.2	1.6	13.2
2	Aragon	0.71	0.5	29.8	-29.5	45.2	0.0	26.7
3	Asturias	0.62	0.35	3.9	-43.7	34.4	13.5	21.0
4	Balearic Islands	0.51	0.45	54.5	-11.2	41.2	-2.8	26.8
5	Basque Country	0.53	0.55	79.5	3.3	45.2	0.0	19.6
6	Canary Islands	1	0.61	7.9	-38.9	39.5	17.0	8.2
7	Cantabria	0.37	0.39	75.0	7.5	45.2	0.0	12.0
8	Castilla-La Mancha	0.77	0.79	98.4	3.4	45.2	0.0	32.1
9	Castilla y Leon	0.51	0.42	53.4	-17.5	45.2	1.5	26.0
10	Catalonia	0.54	0.69	110.9	27.2	45.2	0.0	14.2
11	Extremadura	0.27	0.59	314.0	119.8	45.2	0.0	29.7
12	Galicia	0.87	0.61	17.3	-30.1	41.2	5.0	13.1
13	Madrid	0.65	0.53	94.0	-18.1	42.8	48.5	11.8
14	Murcia	1	0.76	17.2	-24.2	39.2	3.6	7.1
15	Navarra	0.34	0.43	114.4	26.1	40.5	5.7	14.5
16	Rioja	1	0.73	268.9	-27.3	34.6	240.7	10.6
17	Valencian Community	0.56	0.48	63.2	-14.2	45.2	0.0	30.9
	average	0.64	0.55	84.0	-5.4	42.4	19.7	18.7
	weighted average	0.63	0.55	69.2	-7.9	43.7	9.7	17.9

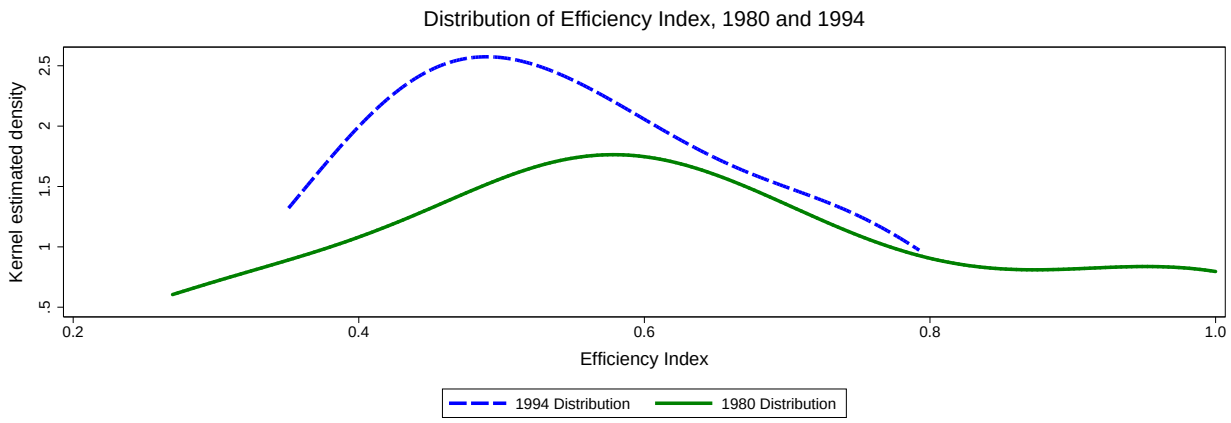

Figure 93: Distributions of efficiency scores in 1980 and 1994

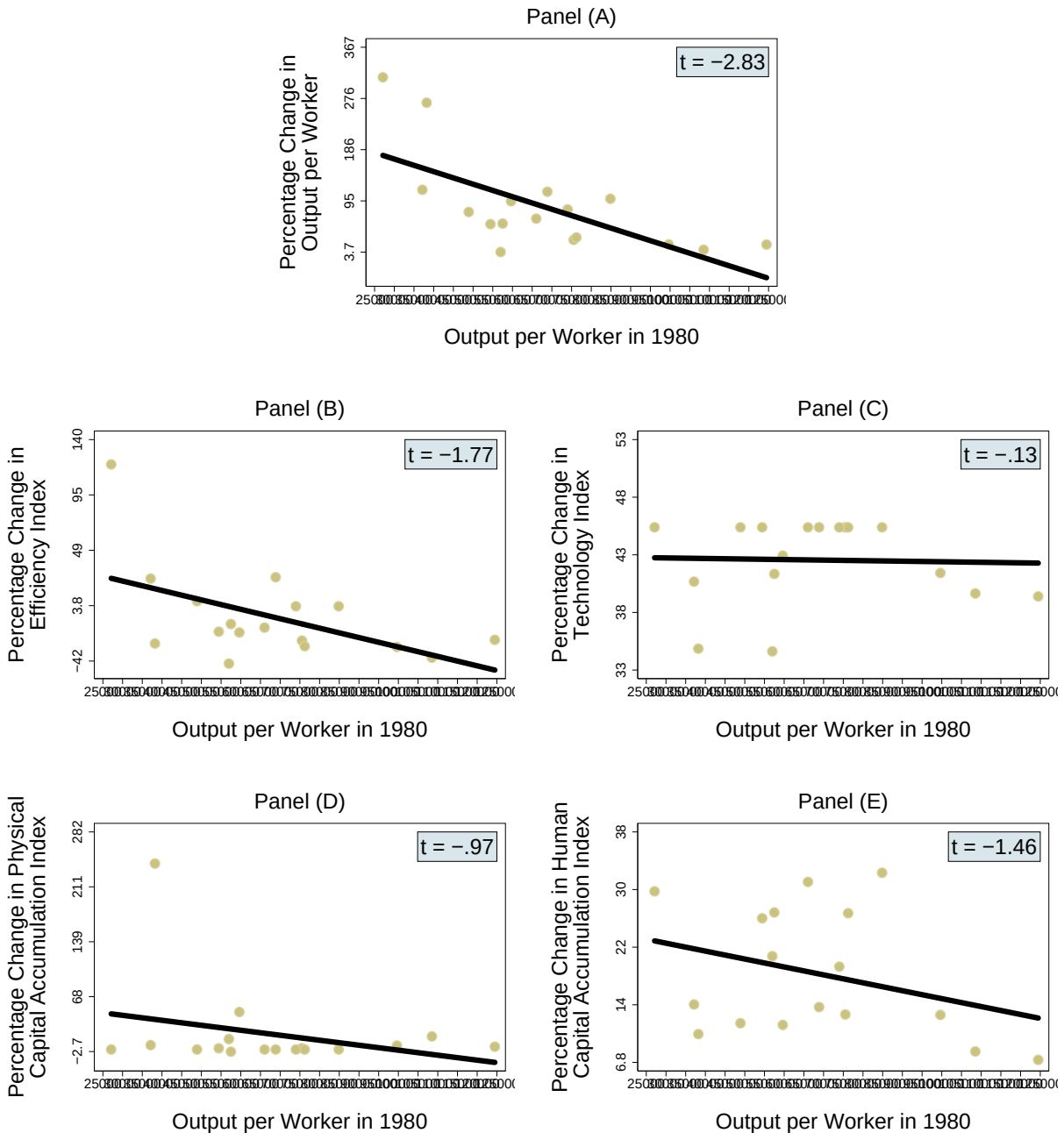

Figure 94: Percentage change (from 1980 to 1994) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

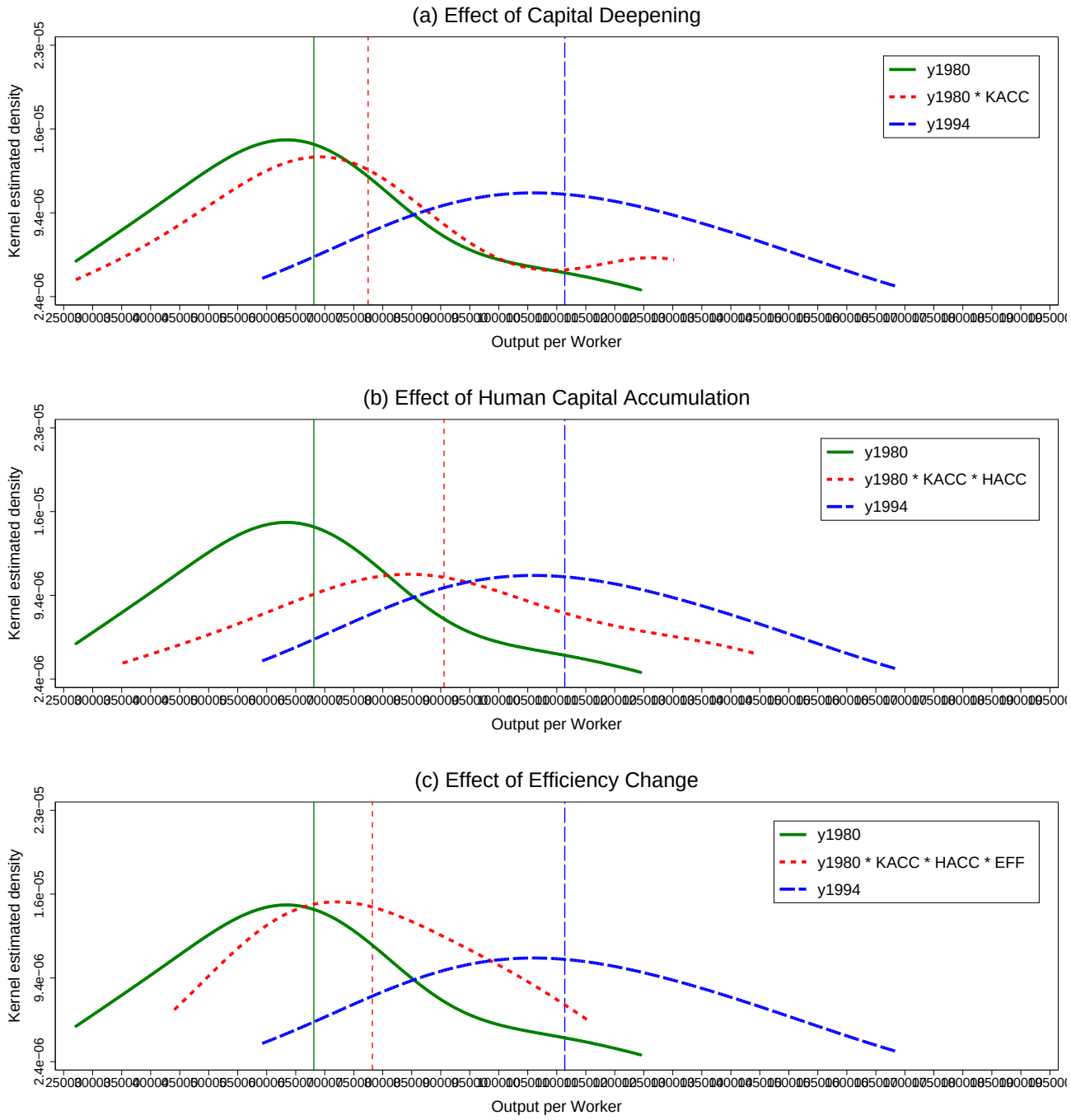

Figure 95: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

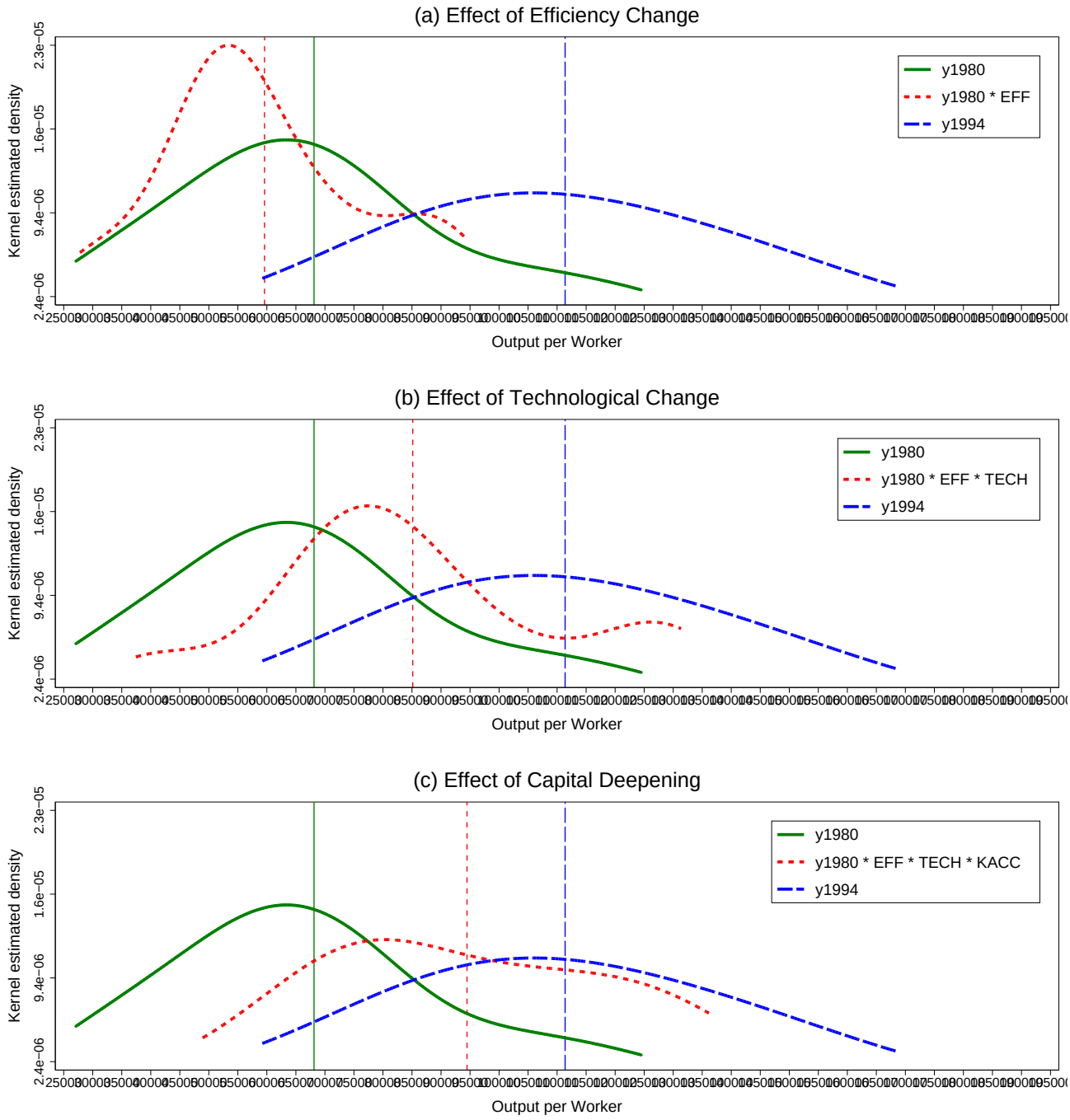

Figure 96: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

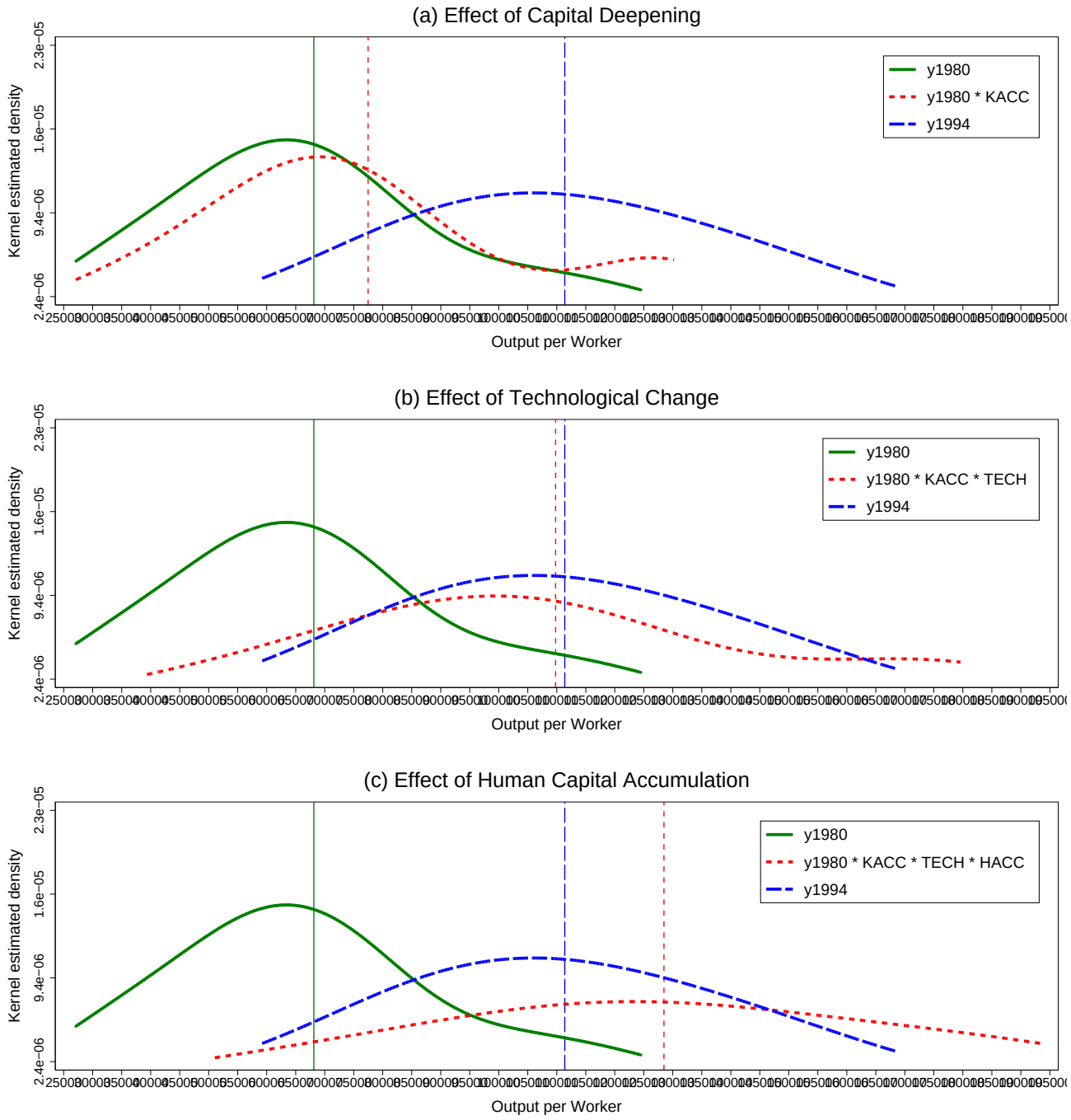

Figure 97: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

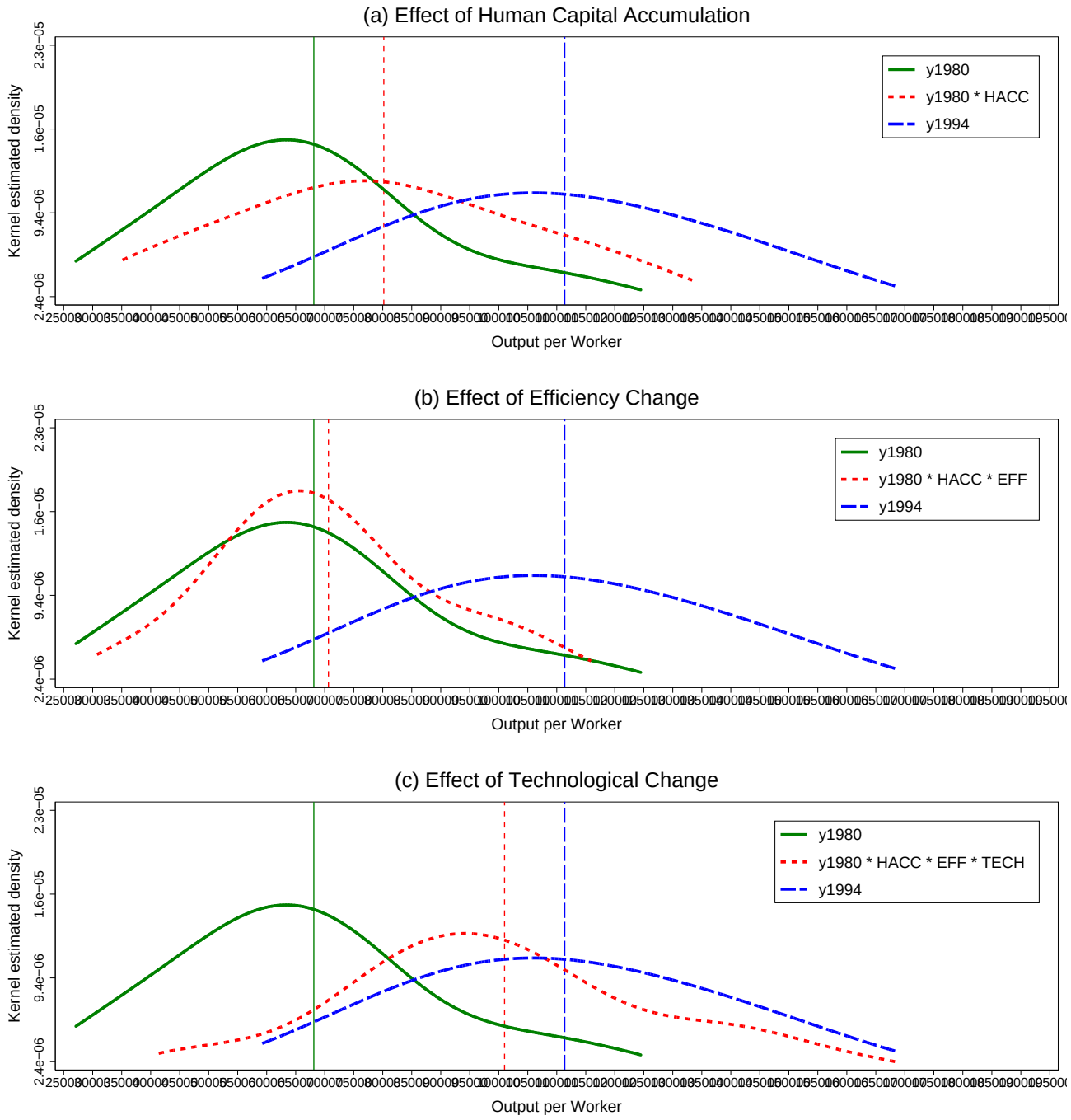

Figure 98: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 30: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{1994})$ vs. $f(y_{1980})$	0.0024
2	$g(y_{1994})$ vs. $f(y_{1980} \times EFF)$	0.0008
3	$g(y_{1994})$ vs. $f(y_{1980} \times TECH)$	0.9772
4	$g(y_{1994})$ vs. $f(y_{1980} \times KACC)$	0.0258
5	$g(y_{1994})$ vs. $f(y_{1980} \times HACC)$	0.0726
6	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.1362
7	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0022
8	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0088
9	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.8264
10	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.7242
11	$g(y_{1994})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.6320
12	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.7544
13	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.8746
14	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0336
15	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.7810

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

17 Energy sector: 1995−2003, output is GVA

17.1 Production function

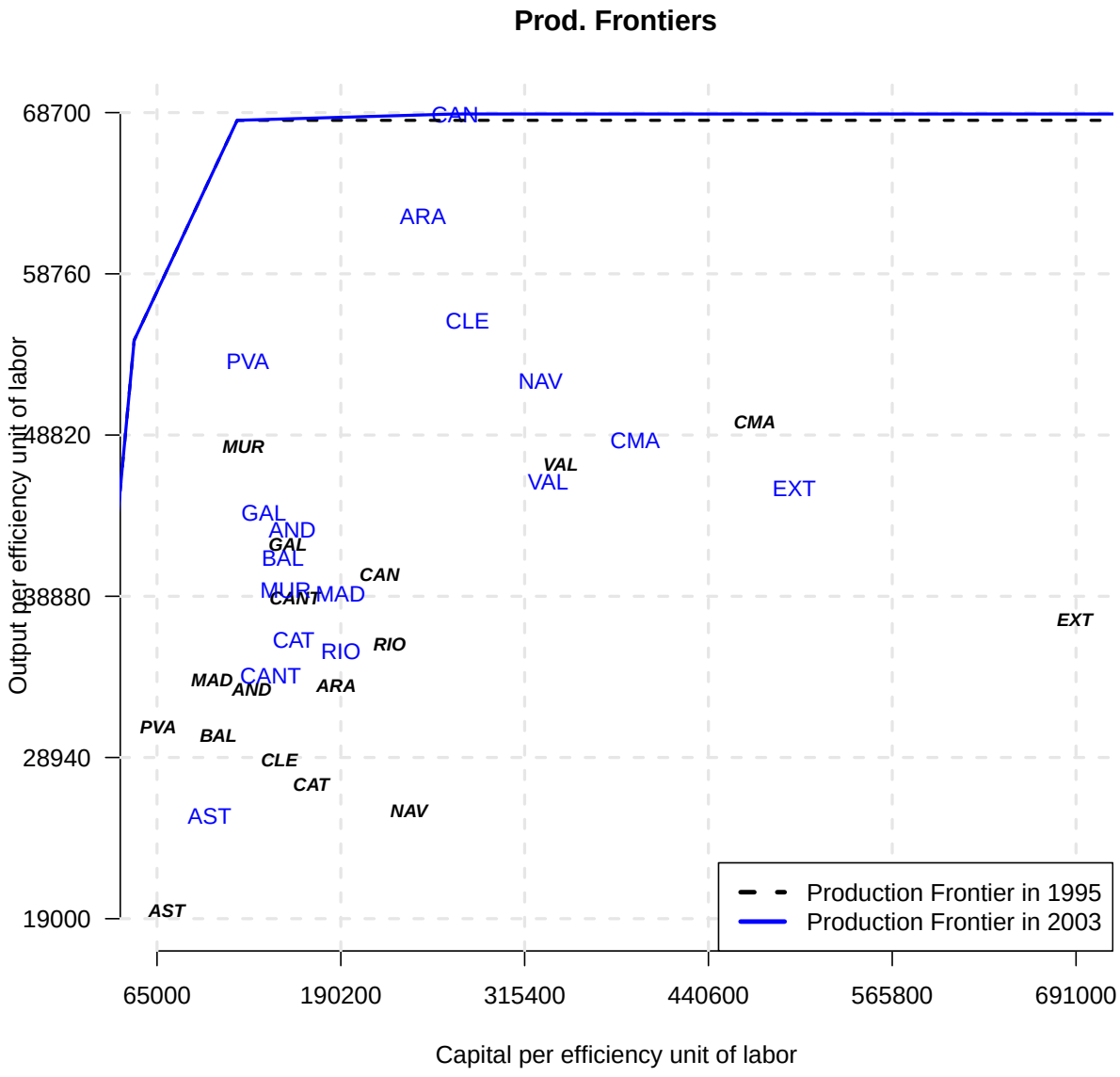

Figure 99: Production frontiers in 1995 and 2003

Notes: The bold italic abbreviations show the 1995 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1995 production frontier and the solid line presents the 2003 production frontier.

17.2 Table with decomposition results

Table 31: Efficiency scores and percentage change of quadripartite decomposition indexes, 1995−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.49	0.63	34.0	29.4	0.1	0.1	3.4
2	Aragon	0.49	0.91	103.1	85.8	0.4	0.1	8.8
3	Asturias	0.33	0.39	49.5	18.7	0.0	13.8	10.8
4	Balearic Islands	0.46	0.6	58.6	31.1	0.1	6.1	14.0
5	Basque Country	0.59	1	61.9	69.7	0.5	0.1	-5.1
6	Canary Islands	0.57	0.5	-1.6	-12.3	0.1	0.0	12.1
7	Cantabria	0.42	0.81	106.1	93.0	0.3	0.2	6.1
8	Castilla-La Mancha	0.73	0.71	7.9	-2.9	0.6	0.0	10.5
9	Castilla y Leon	0.4	0.53	39.6	32.5	0.2	0.0	5.1
10	Catalonia	0.69	0.67	2.5	-2.9	0.6	0.0	4.9
11	Extremadura	0.55	0.66	49.7	20.9	0.6	0.0	23.1
12	Galicia	0.62	0.65	20.5	4.7	0.1	0.0	15.0
13	Madrid	0.52	0.57	30.9	9.9	0.1	7.1	11.0
14	Murcia	0.71	0.57	-1.4	-18.5	0.1	2.6	17.9
15	Navarra	0.38	0.76	151.2	102.0	0.5	0.1	23.5
16	Rioja	0.53	0.78	54.4	47.1	0.0	15.2	-8.9
17	Valencian Community	0.53	0.52	7.1	-1.4	0.3	0.0	8.2
	average	0.53	0.66	45.5	29.8	0.3	2.7	9.4
	weighted average	0.55	0.63	29.0	17.7	0.3	1.6	8.0

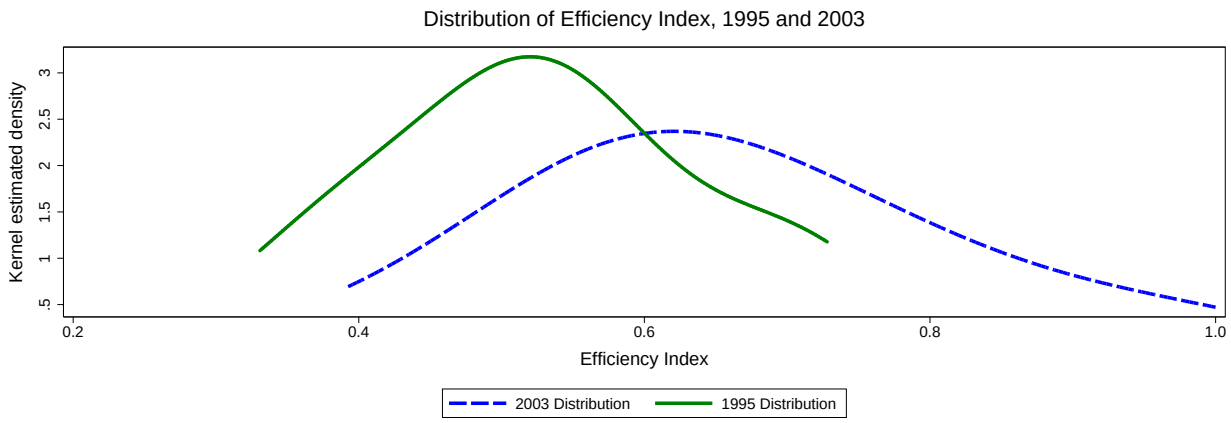

Figure 100: Distributions of efficiency scores in 1995 and 2003

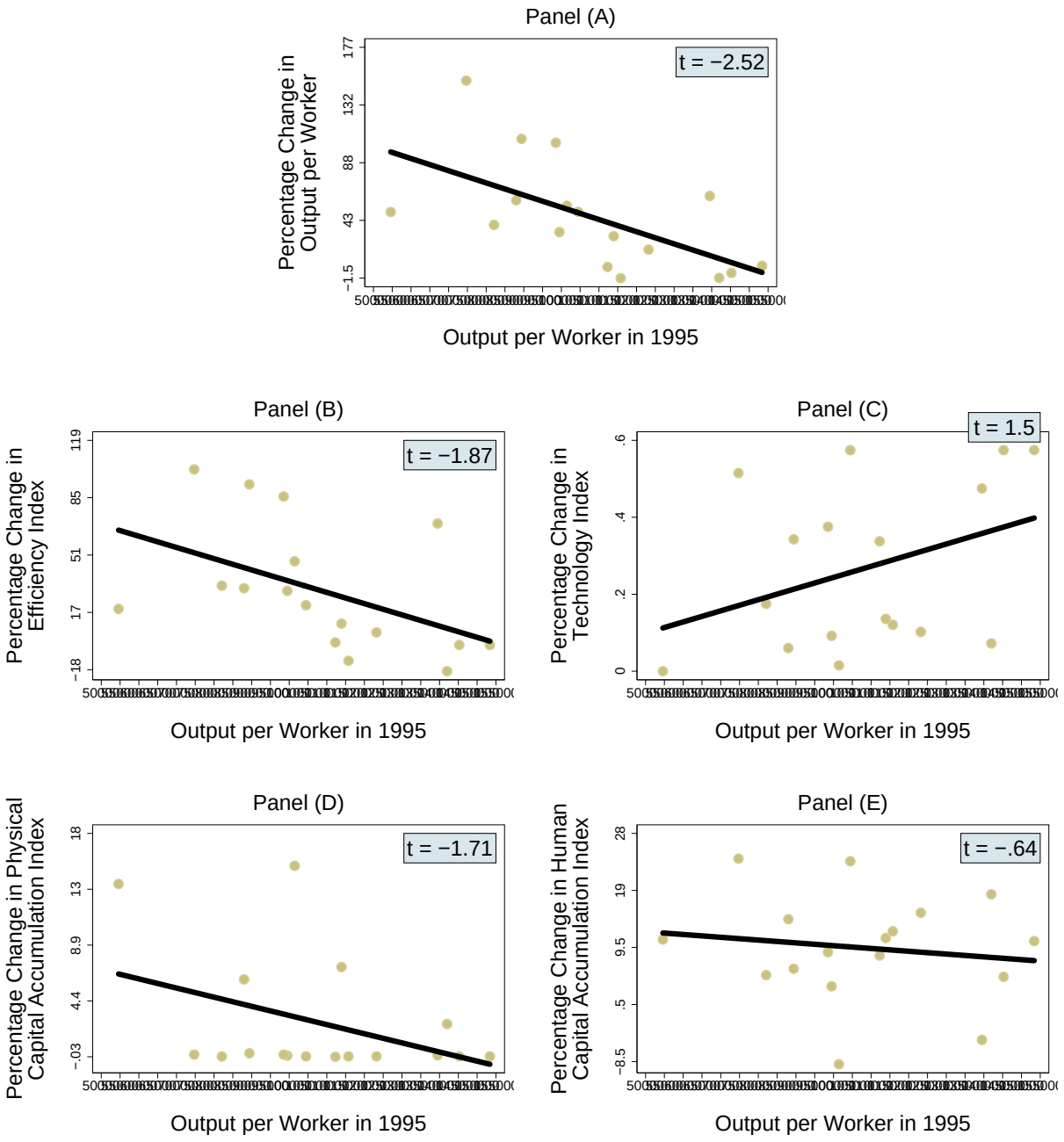

Figure 101: Percentage change (from 1995 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1995

Note: Each panel contains a GLS regression line.

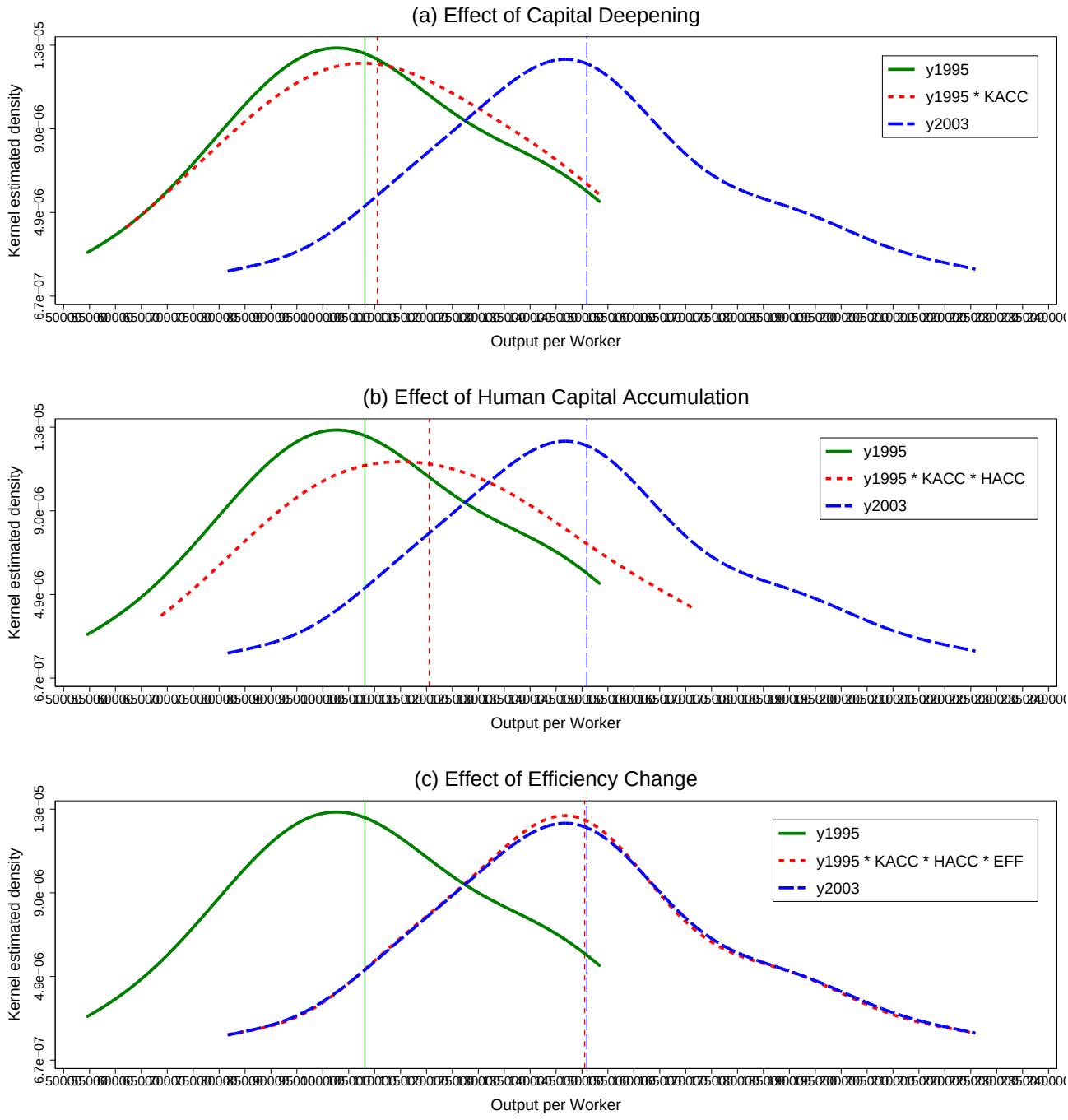

Figure 102: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1995 distribution.

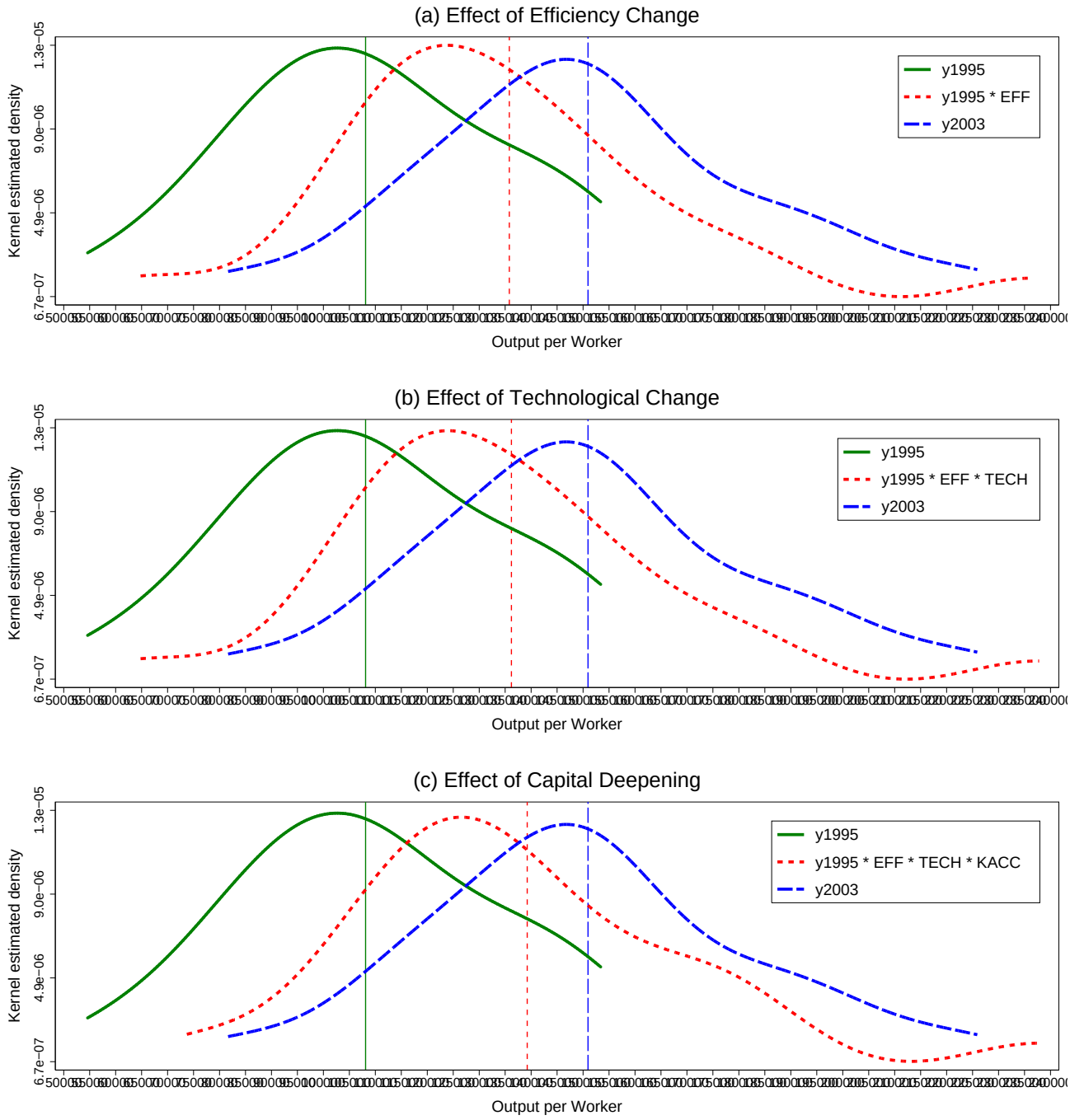

Figure 103: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1995 distribution.

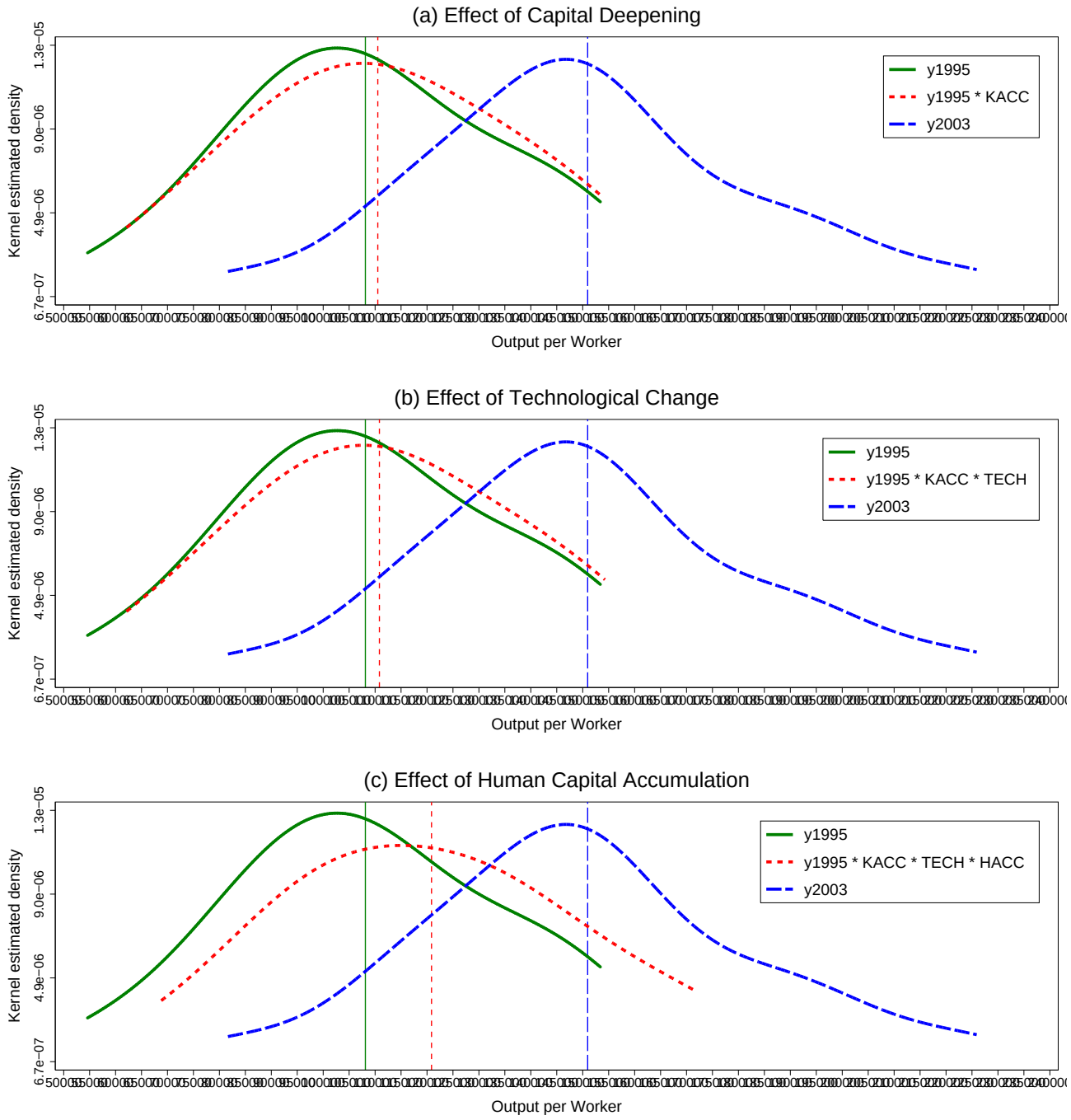

Figure 104: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1995 distribution.

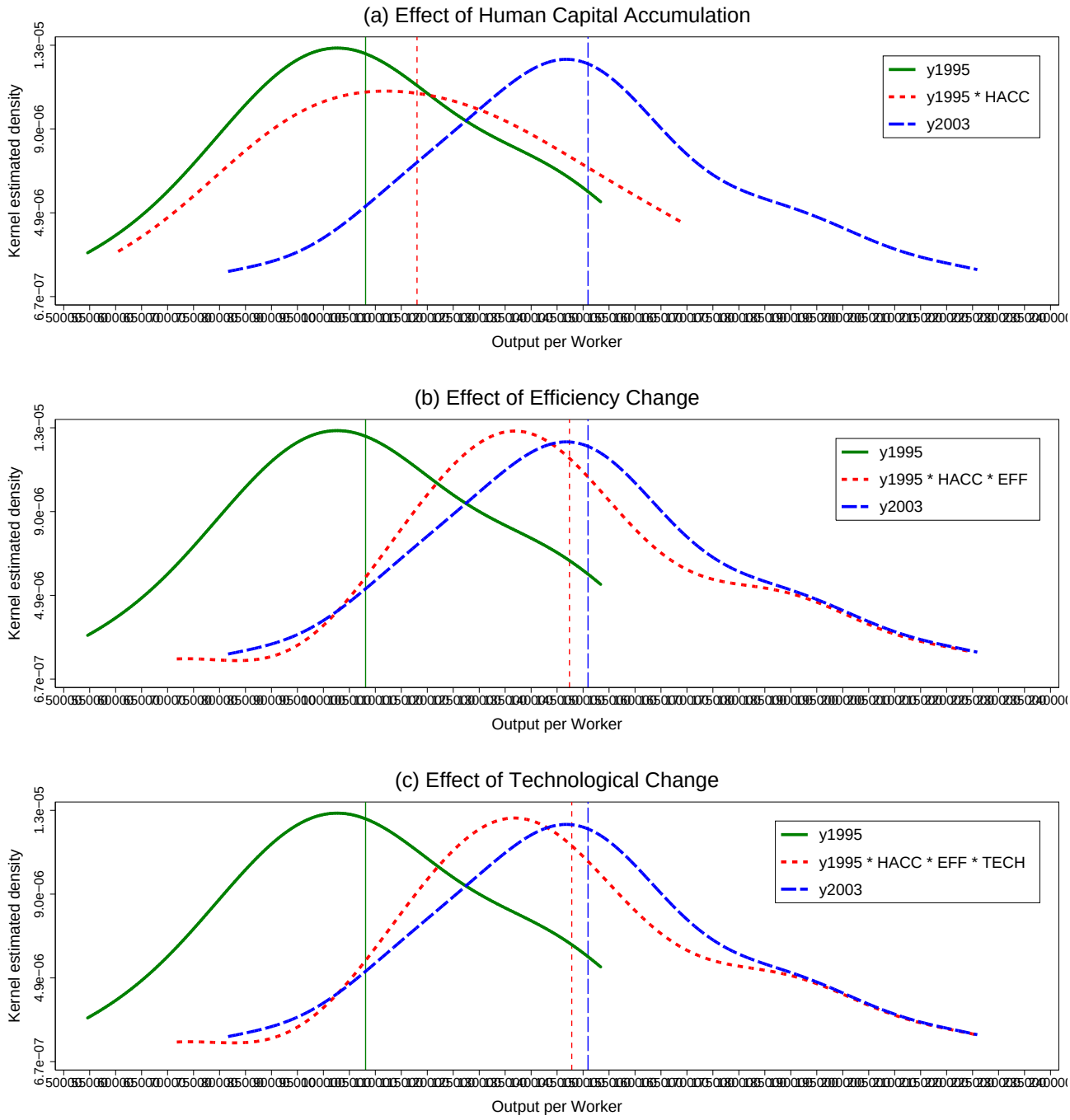

Figure 105: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1995 distribution.

Table 32: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1995})$	0.0160
2	$g(y_{2003})$ vs. $f(y_{1995} \times EFF)$	0.5274
3	$g(y_{2003})$ vs. $f(y_{1995} \times TECH)$	0.0176
4	$g(y_{2003})$ vs. $f(y_{1995} \times KACC)$	0.0296
5	$g(y_{2003})$ vs. $f(y_{1995} \times HACC)$	0.0718
6	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH)$	0.5680
7	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC)$	0.5792
8	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times HACC)$	0.8272
9	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC)$	0.0266
10	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times HACC)$	0.0776
11	$g(y_{2003})$ vs. $f(y_{1995} \times KACC \times HACC)$	0.0980
12	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times KACC)$	0.6166
13	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times HACC)$	0.8474
14	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC \times HACC)$	0.9994
15	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC \times HACC)$	0.1020

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

18 Industrial sector: 1980−2003, output is GVA

18.1 Production function

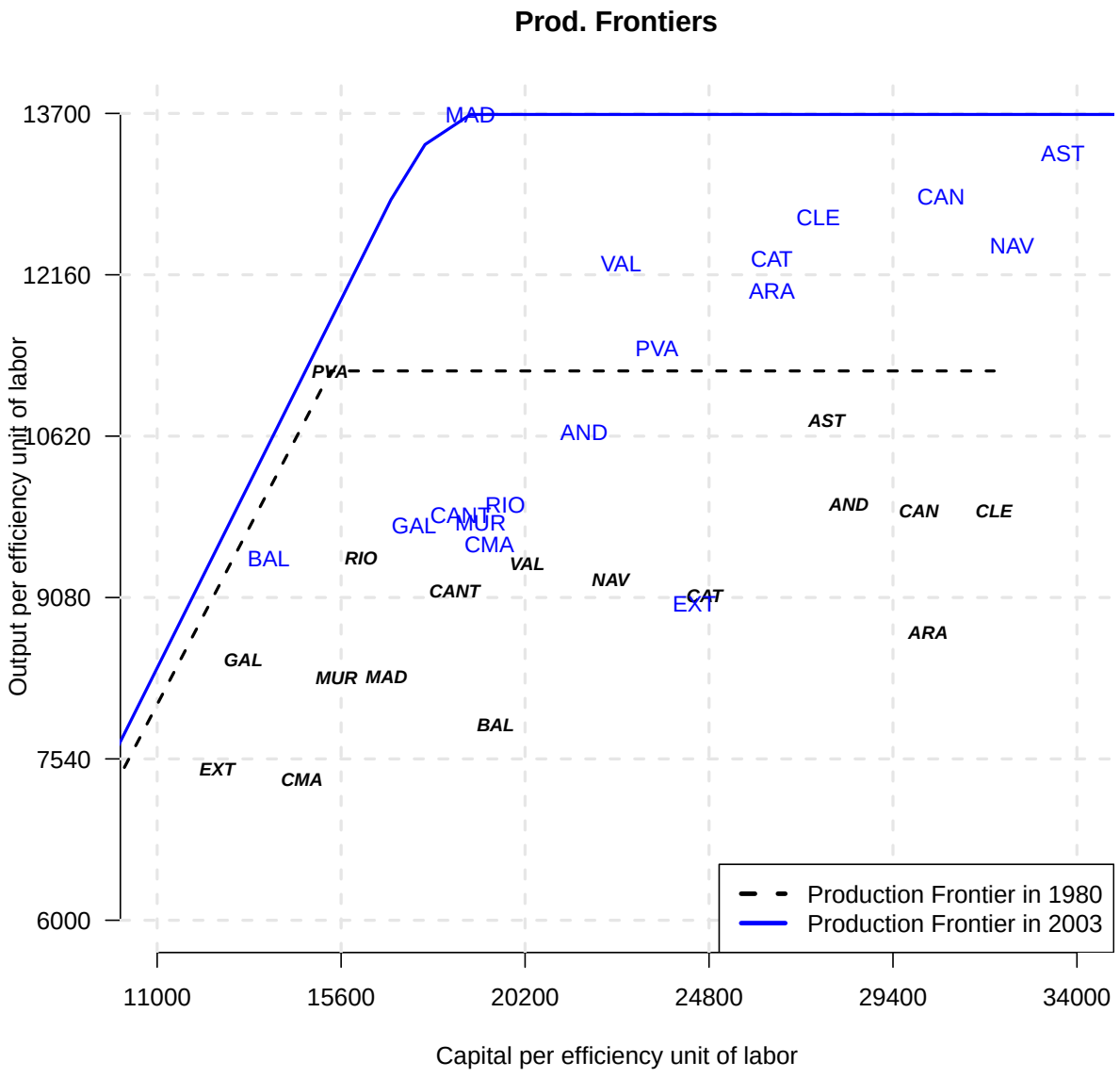

Figure 106: Production frontiers in 1980 and 2003

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1980 production frontier and the solid line presents the 2003 production frontier.

18.2 Table with decomposition results

Table 33: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.89	0.78	38.8	-12.2	21.8	0.0	29.9
2	Aragon	0.78	0.88	78.4	12.7	21.8	0.0	30.0
3	Asturias	0.96	0.97	55.5	1.5	21.8	0.0	25.8
4	Balearic Islands	0.7	0.9	58.0	28.1	12.7	-3.5	13.4
5	Basque Country	0.88	0.94	72.8	6.9	21.8	0.0	32.7
6	Canary Islands	0.81	0.72	43.3	-10.9	21.1	13.3	17.3
7	Cantabria	0.88	0.93	73.5	5.4	21.8	0.0	35.1
8	Castilla-La Mancha	0.69	0.7	69.6	2.2	12.7	29.2	14.0
9	Castilla y Leon	0.81	0.9	74.1	11.1	21.8	0.0	28.7
10	Catalonia	0.84	0.9	69.0	7.2	21.8	7.0	21.1
11	Extremadura	0.81	0.66	68.0	-18.9	12.7	56.1	17.8
12	Galicia	0.88	0.74	54.0	-16.1	10.8	43.3	15.7
13	Madrid	0.74	1	110.2	35.1	17.7	16.9	13.0
14	Murcia	0.74	0.72	54.7	-3.2	13.2	23.2	14.6
15	Navarra	0.82	0.91	71.4	10.5	21.8	1.4	25.7
16	Rioja	1	0.84	32.9	-16.3	12.7	23.4	14.2
17	Valencian Community	0.84	0.73	38.9	-13.5	15.5	21.1	14.8
	average	0.83	0.84	62.5	1.7	17.8	13.6	21.4
	weighted average	0.83	0.84	63.5	2.4	18.7	12.4	21.3

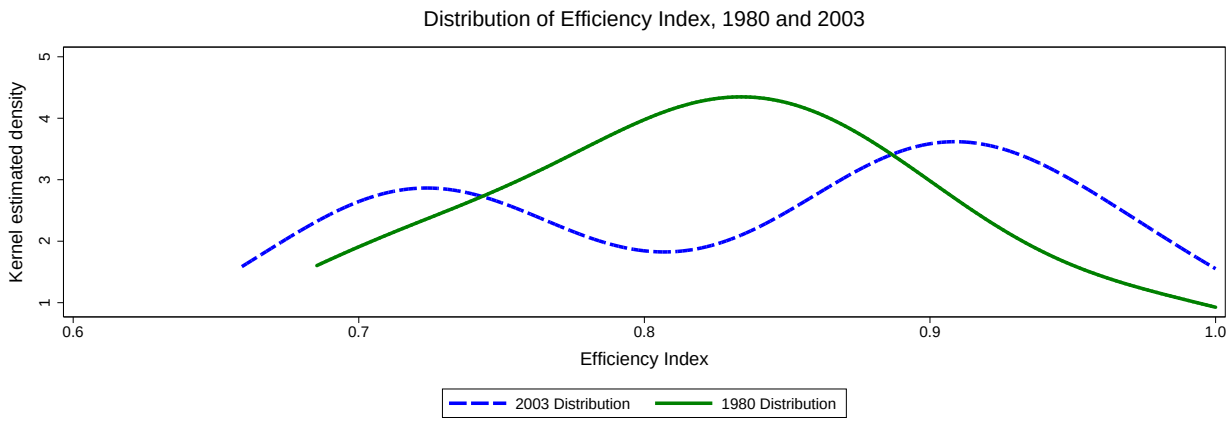

Figure 107: Distributions of efficiency scores in 1980 and 2003

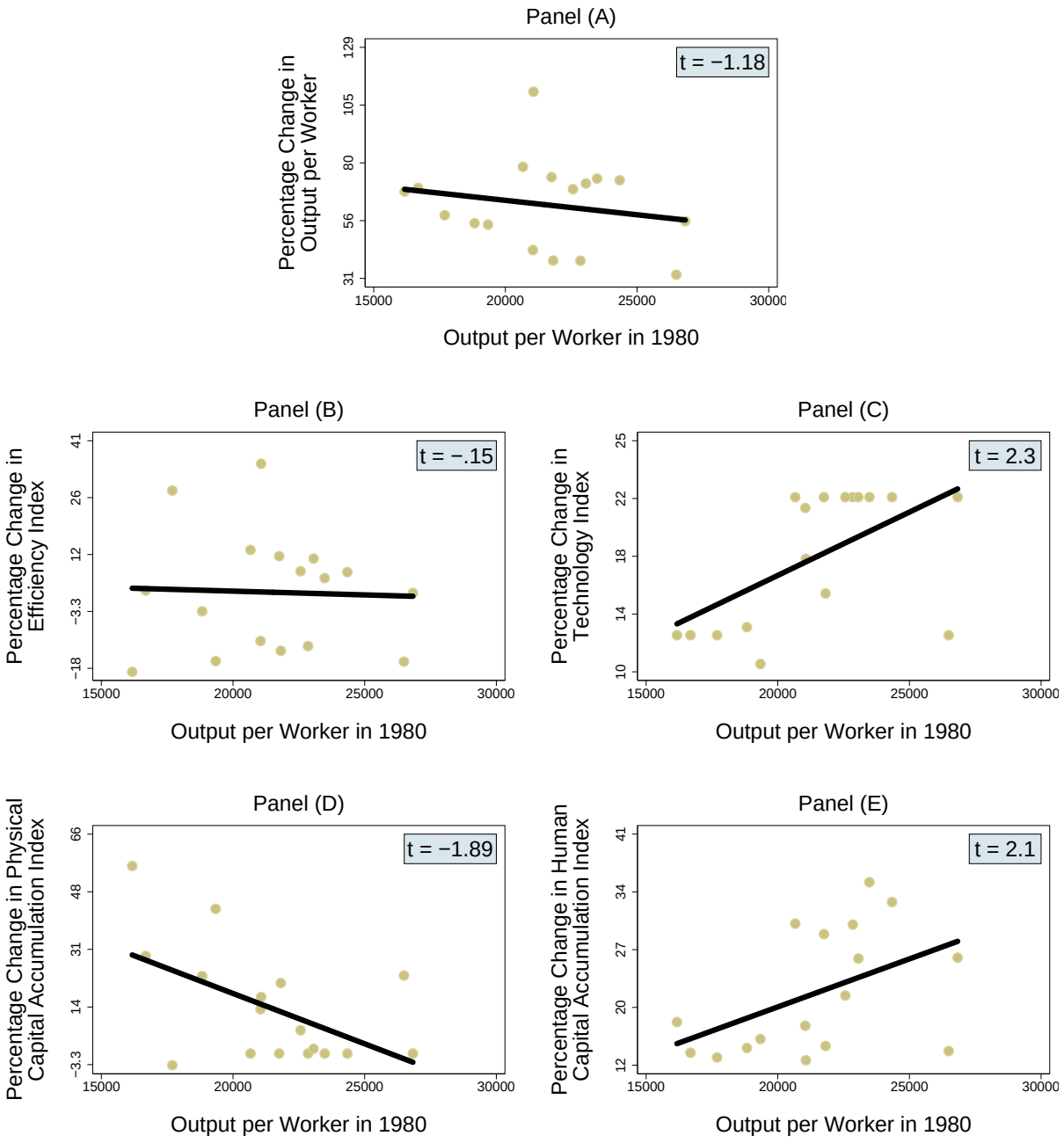

Figure 108: Percentage change (from 1980 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

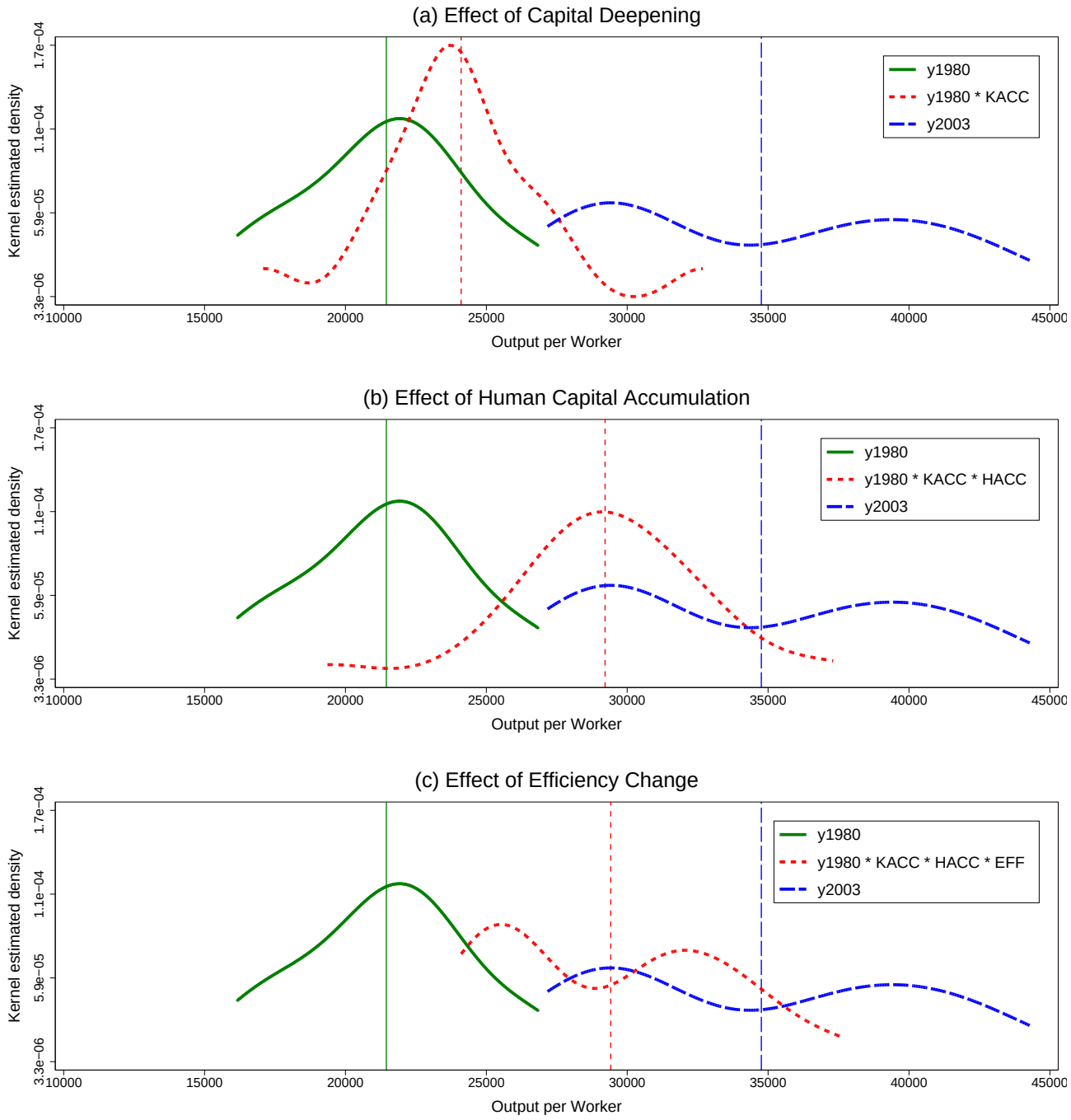

Figure 109: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

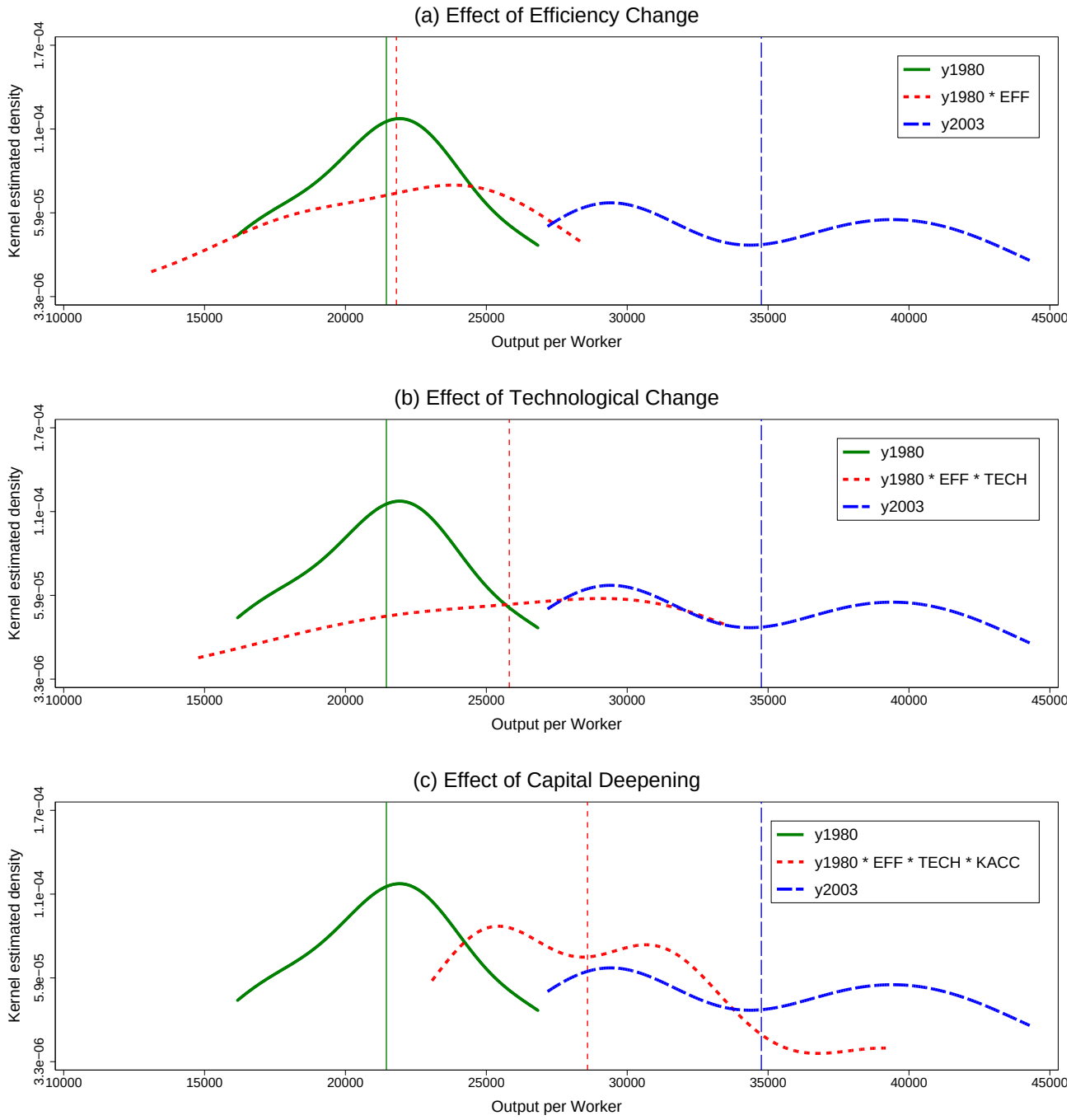

Figure 110: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

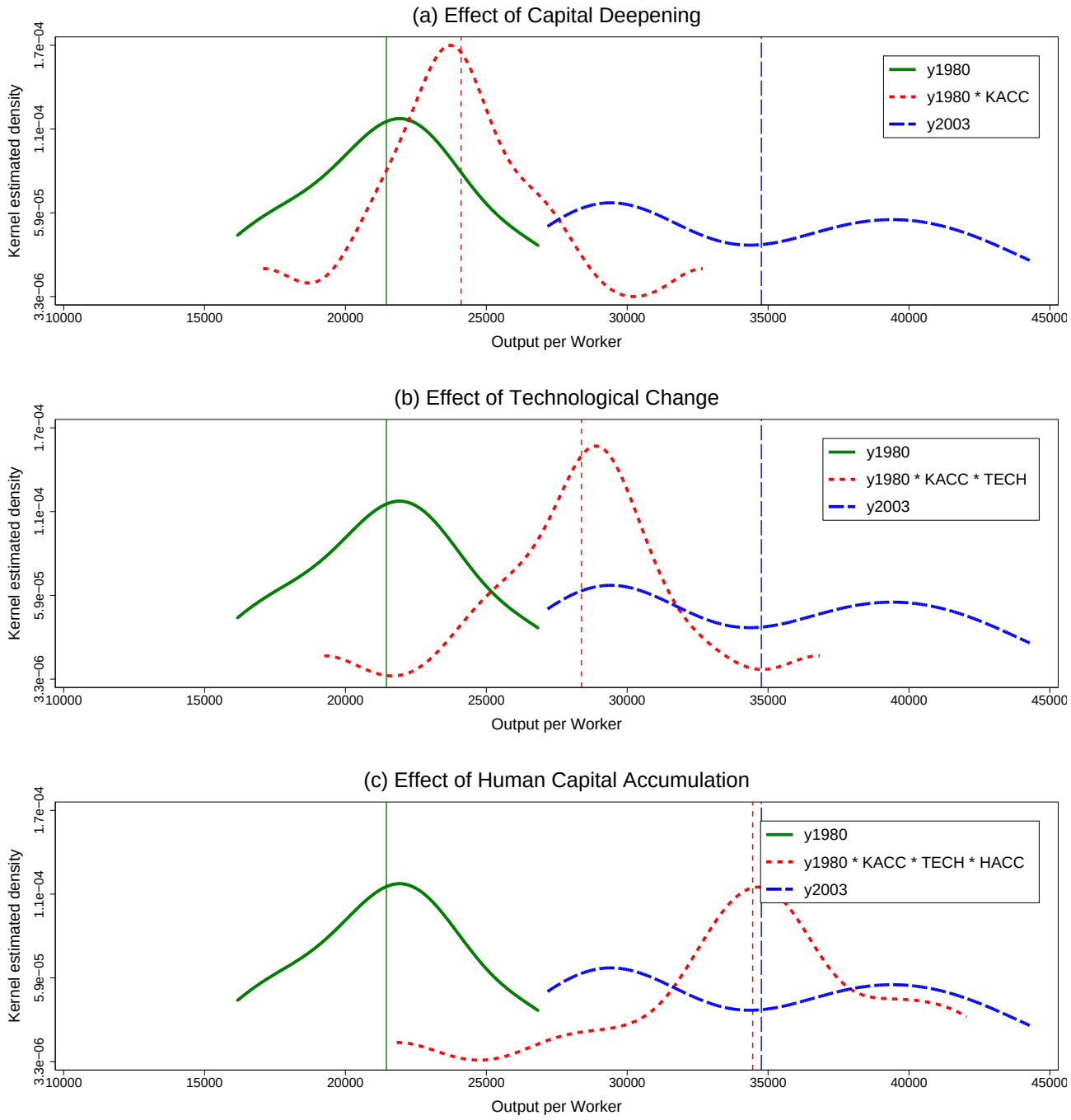

Figure 111: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

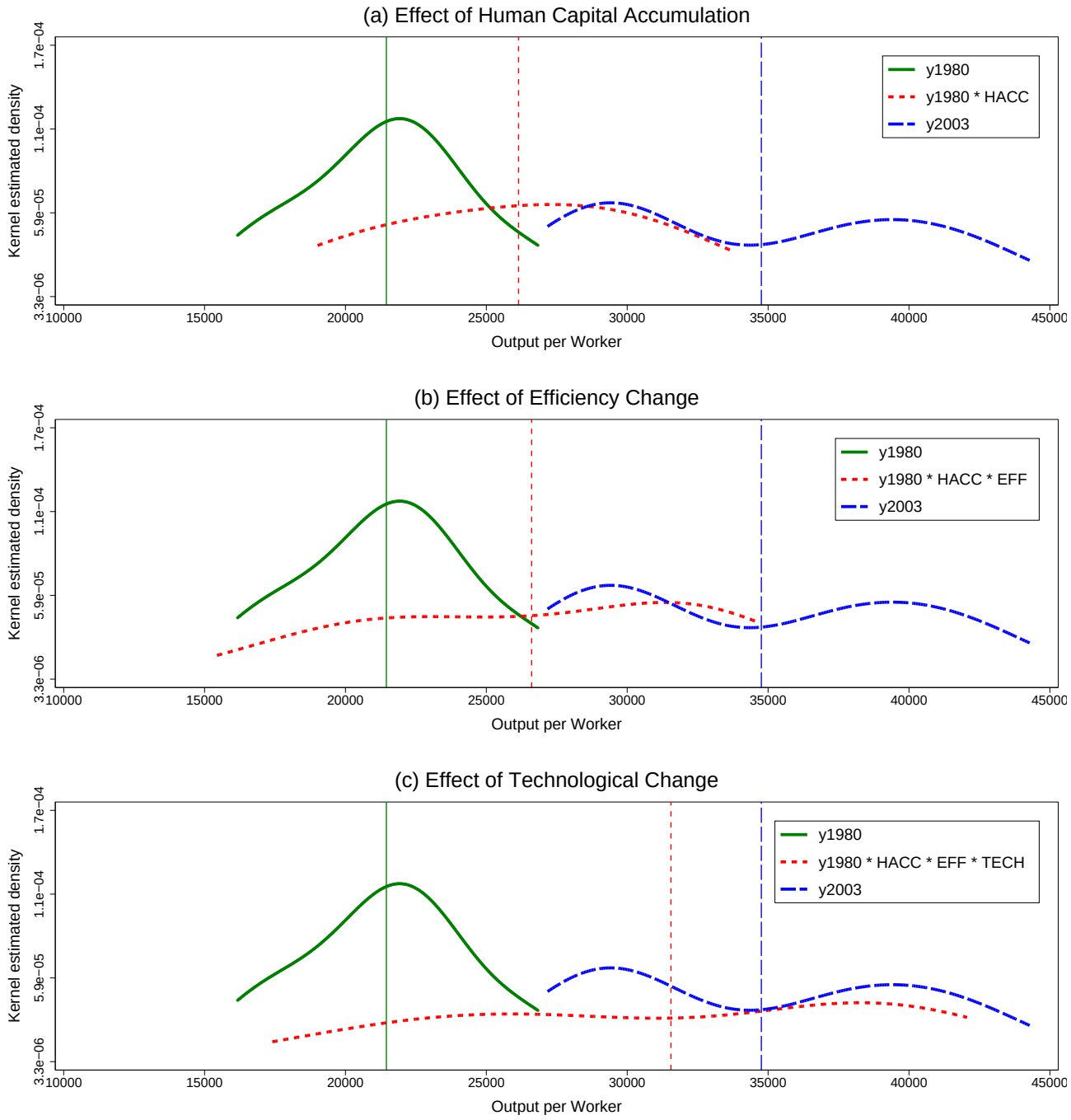

Figure 112: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 34: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1980})$	0.0000
2	$g(y_{2003})$ vs. $f(y_{1980} \times EFF)$	0.0000
3	$g(y_{2003})$ vs. $f(y_{1980} \times TECH)$	0.0052
4	$g(y_{2003})$ vs. $f(y_{1980} \times KACC)$	0.0000
5	$g(y_{2003})$ vs. $f(y_{1980} \times HACC)$	0.0114
6	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.0206
7	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0000
8	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0160
9	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.2208
10	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.1048
11	$g(y_{2003})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.1676
12	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.0198
13	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.3300
14	$g(y_{2003})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0112
15	$g(y_{2003})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.0286

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

19 Industrial sector: 1980−1994, output is GVA

19.1 Production function

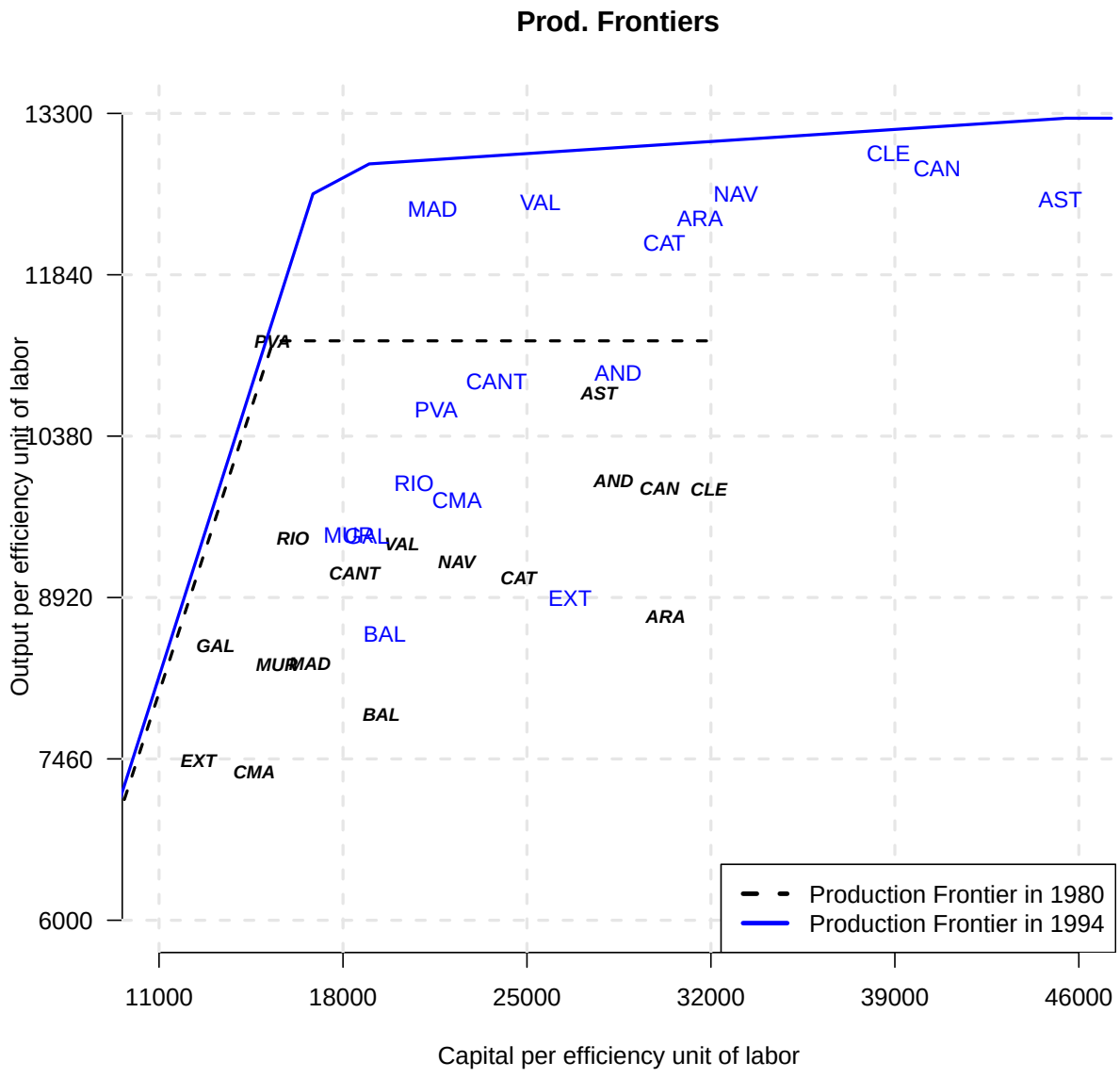

Figure 113: Production frontiers in 1980 and 1994

Notes: The bold italic abbreviations show the 1980 observations and the normal font abbreviations show the 1994 observations. The dotted line represents the 1980 production frontier and the solid line presents the 1994 production frontier.

19.2 Table with decomposition results

Table 35: Efficiency scores and percentage change of quadripartite decomposition indexes, 1980−1994

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.89	0.84	30.4	-5.0	15.5	0.3	18.4
2	Aragon	0.78	0.95	66.9	21.7	15.9	0.4	17.9
3	Asturias	0.96	0.94	31.9	-1.4	16.7	1.3	13.3
4	Balearic Islands	0.7	0.67	31.4	-4.5	14.3	3.2	16.6
5	Basque Country	0.88	0.97	50.9	10.2	16.5	0.9	16.5
6	Canary Islands	0.81	0.84	41.0	3.6	14.3	5.5	12.9
7	Cantabria	0.88	0.98	52.6	11.7	16.5	0.7	16.4
8	Castilla-La Mancha	0.69	0.76	56.7	11.0	8.1	20.7	8.3
9	Castilla y Leon	0.81	0.93	52.0	15.1	15.4	0.5	13.8
10	Catalonia	0.84	0.97	57.1	15.4	14.8	1.3	17.0
11	Extremadura	0.81	0.69	42.2	-15.4	8.3	42.3	9.0
12	Galicia	0.88	0.74	32.2	-16.1	7.8	34.4	8.8
13	Madrid	0.74	0.97	74.5	30.4	12.8	9.8	8.1
14	Murcia	0.74	0.74	34.0	0.7	7.9	13.8	8.4
15	Navarra	0.82	0.96	57.8	17.0	15.4	0.8	15.8
16	Rioja	1	0.82	11.7	-17.6	8.0	15.4	8.8
17	Valencian Community	0.84	0.77	25.4	-8.0	10.6	13.0	9.1
	average	0.83	0.86	44.0	4.0	12.9	9.7	12.9
	weighted average	0.83	0.87	46.0	6.0	13.3	8.2	13.4

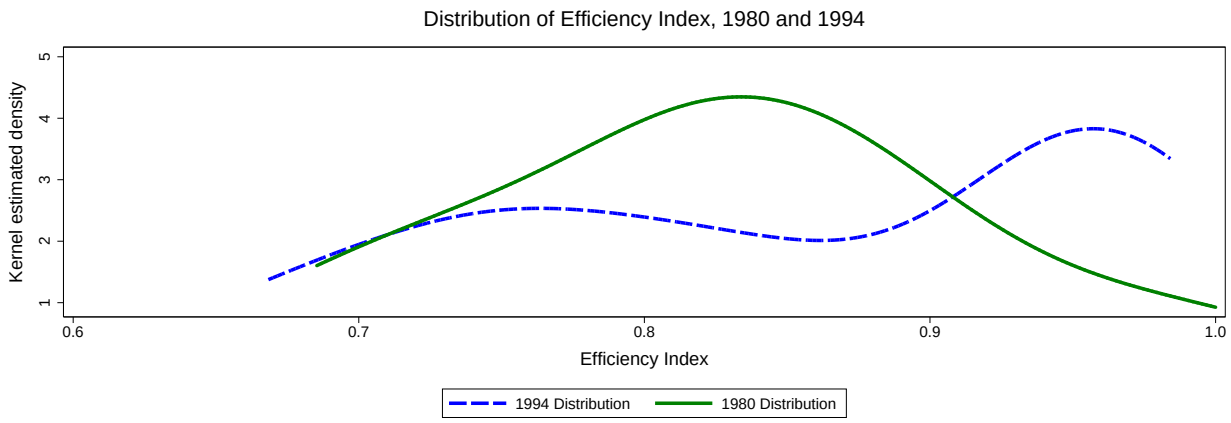

Figure 114: Distributions of efficiency scores in 1980 and 1994

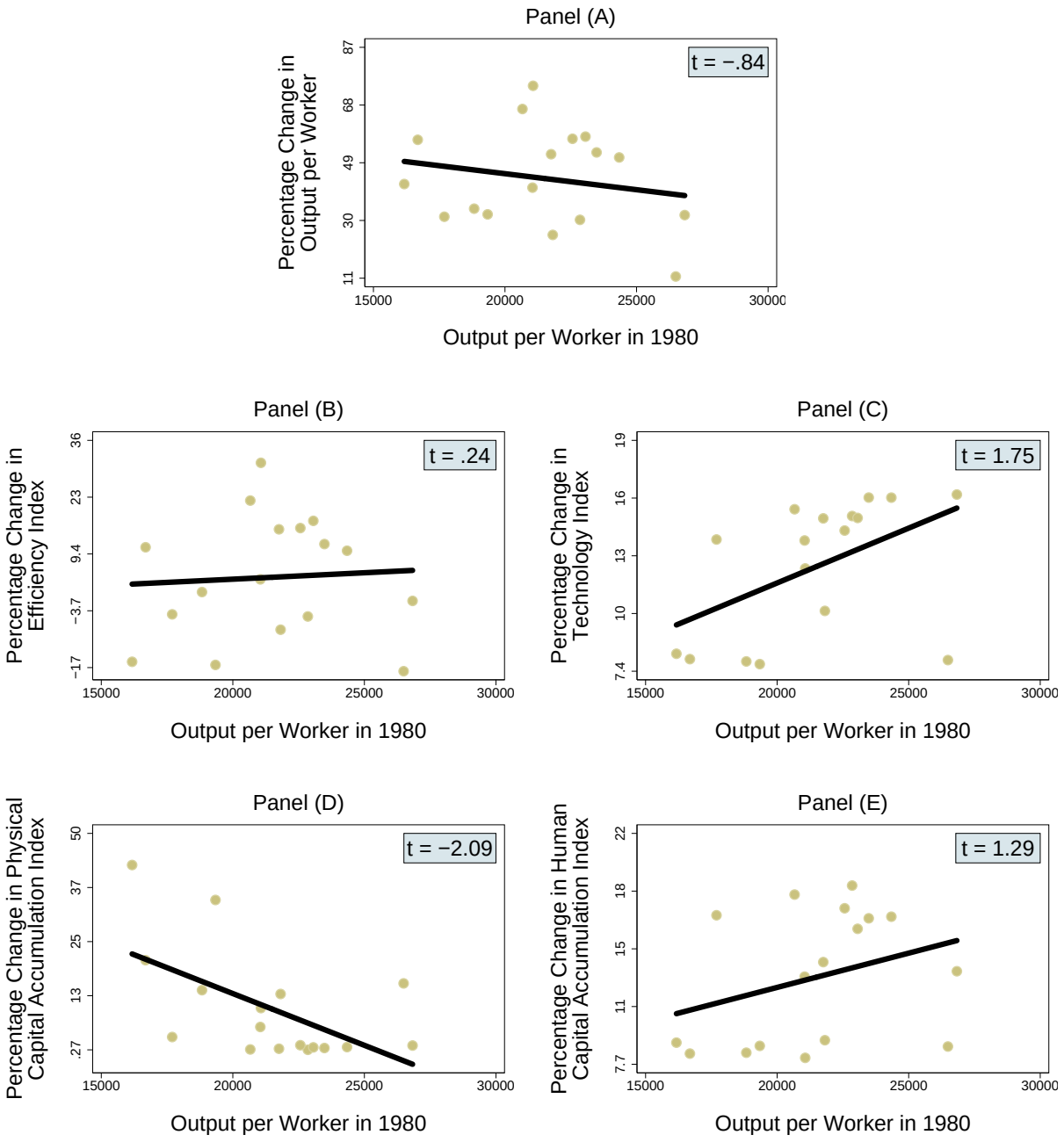

Figure 115: Percentage change (from 1980 to 1994) in output per worker and four decomposition indexes, plotted against output per worker in 1980

Note: Each panel contains a GLS regression line.

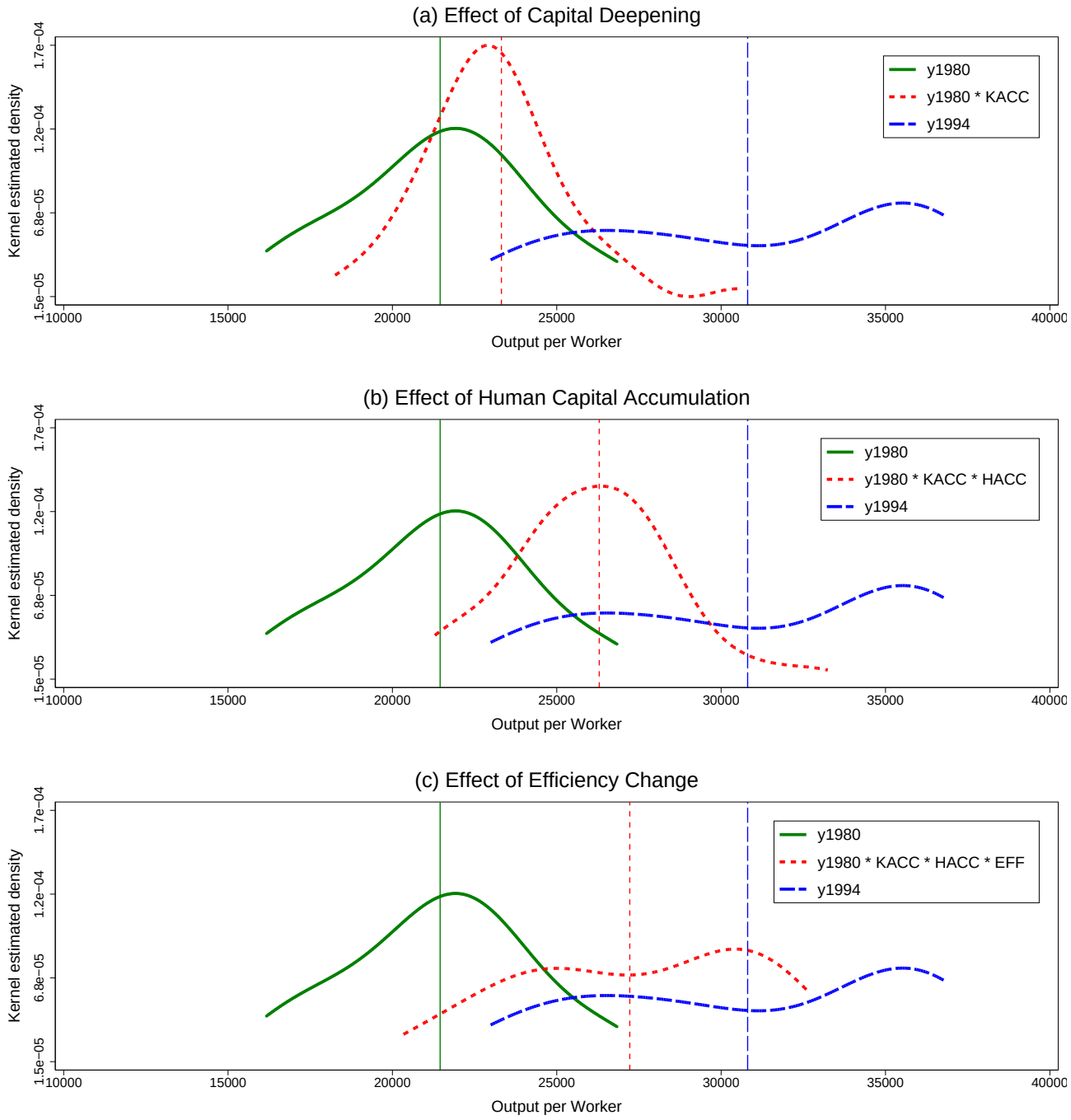

Figure 116: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1980 distribution.

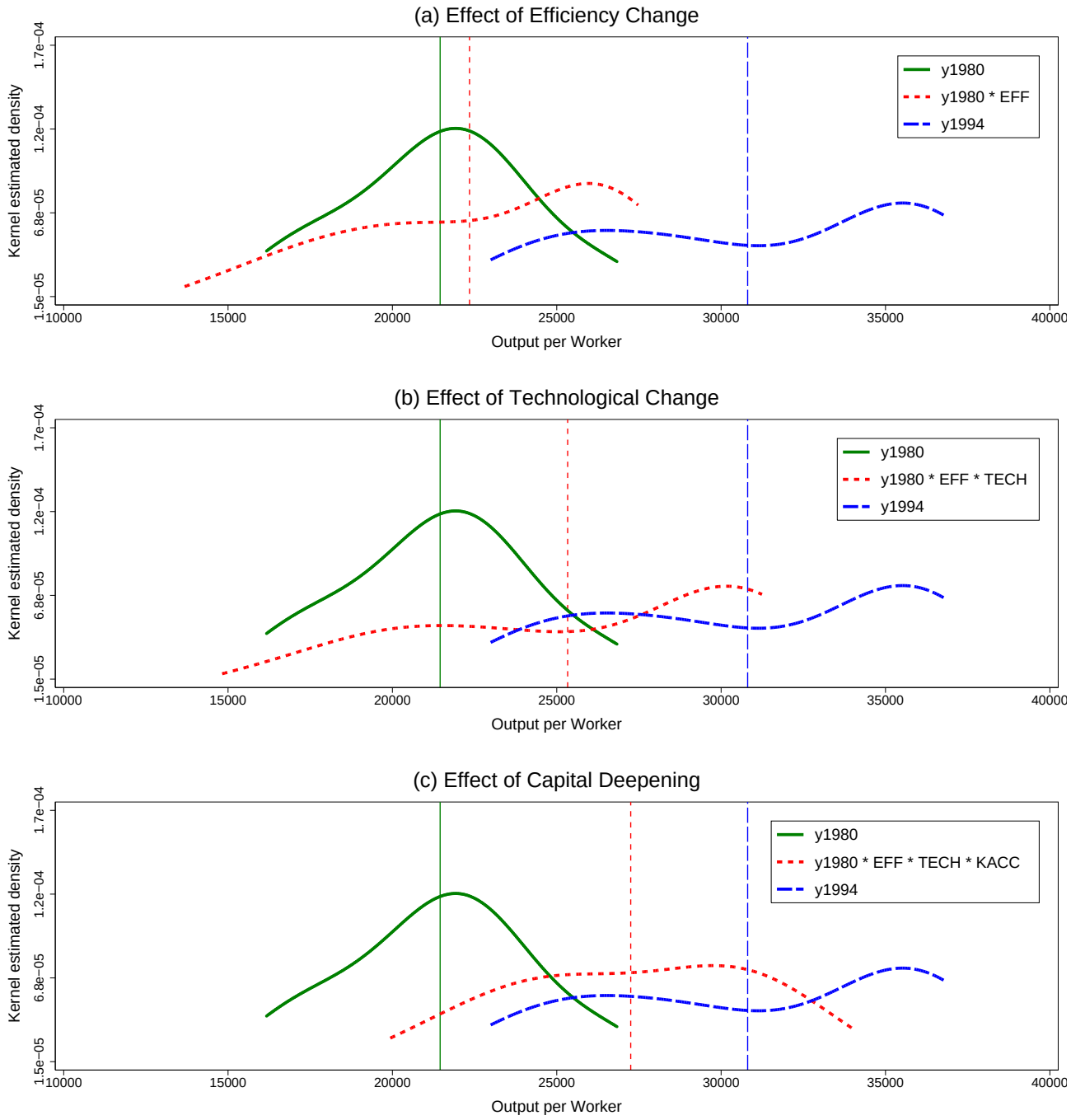

Figure 117: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1980 distribution.

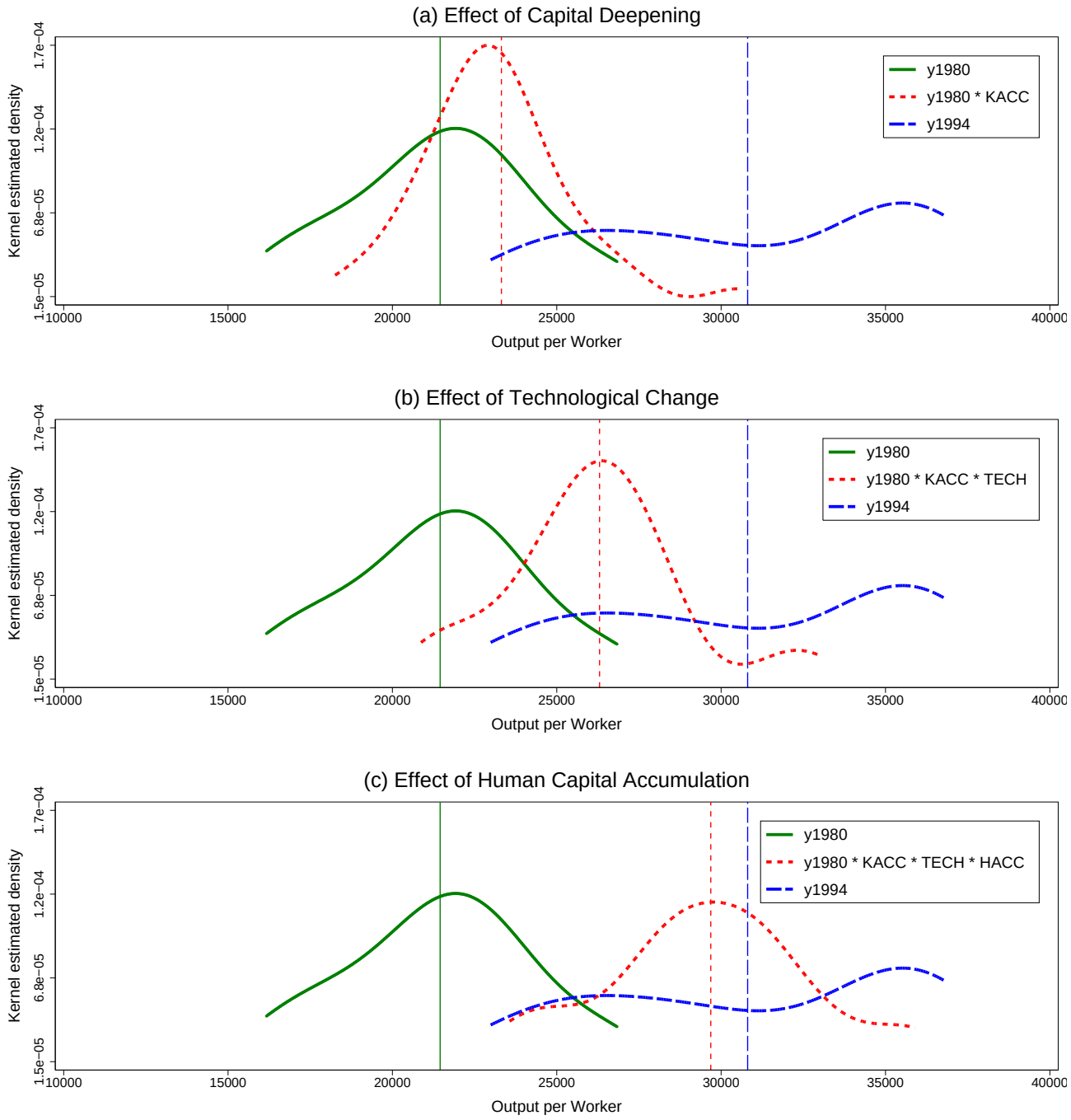

Figure 118: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1980 distribution.

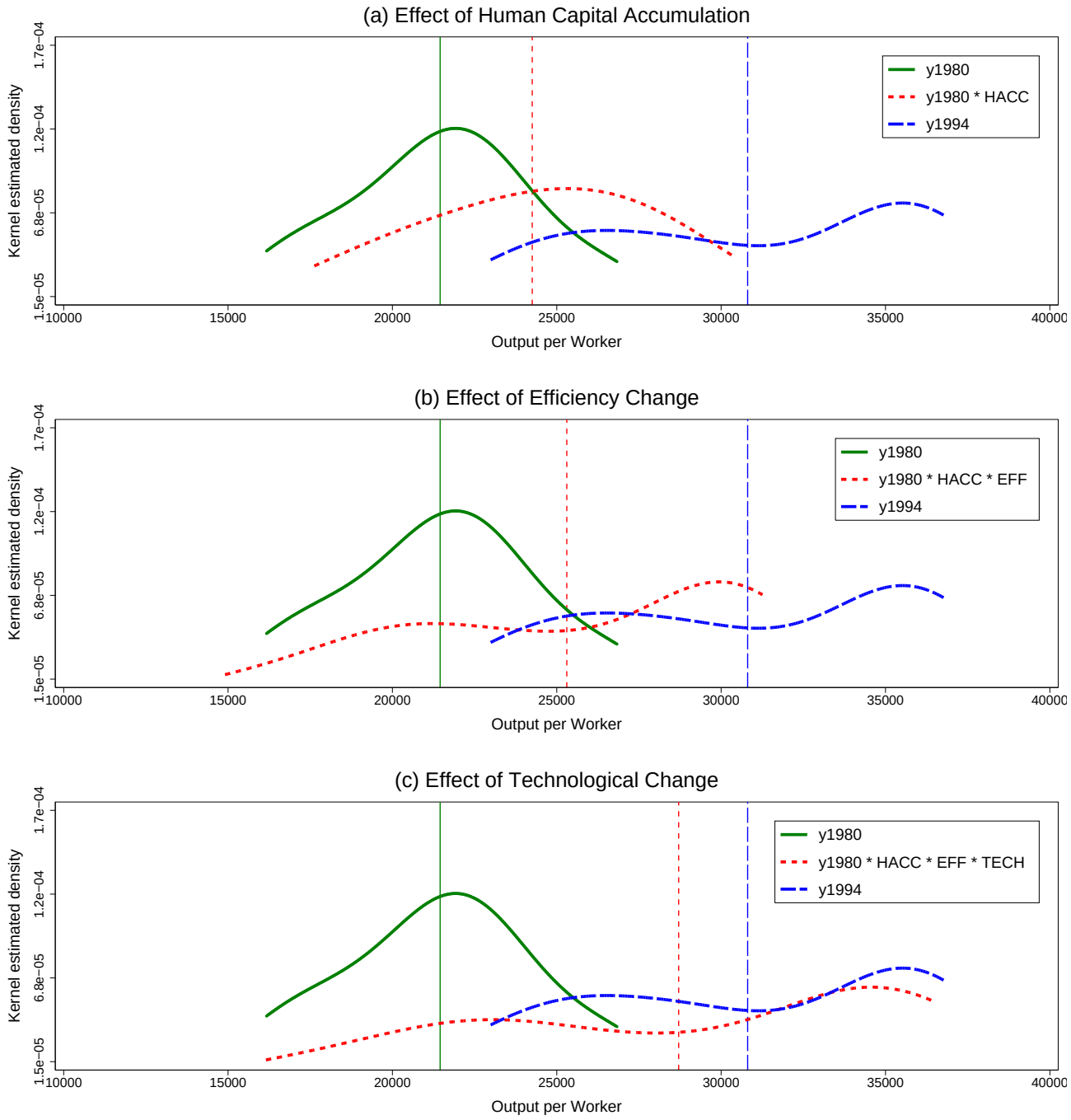

Figure 119: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1980 distribution and the dashed curve is the actual 1994 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1980 distribution.

Table 36: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{1994})$ vs. $f(y_{1980})$	0.0002
2	$g(y_{1994})$ vs. $f(y_{1980} \times EFF)$	0.0044
3	$g(y_{1994})$ vs. $f(y_{1980} \times TECH)$	0.0114
4	$g(y_{1994})$ vs. $f(y_{1980} \times KACC)$	0.0008
5	$g(y_{1994})$ vs. $f(y_{1980} \times HACC)$	0.0100
6	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH)$	0.0218
7	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC)$	0.0082
8	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times HACC)$	0.0180
9	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC)$	0.0180
10	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times HACC)$	0.0966
11	$g(y_{1994})$ vs. $f(y_{1980} \times KACC \times HACC)$	0.0238
12	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times KACC)$	0.0656
13	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times TECH \times HACC)$	0.7382
14	$g(y_{1994})$ vs. $f(y_{1980} \times EFF \times KACC \times HACC)$	0.0338
15	$g(y_{1994})$ vs. $f(y_{1980} \times TECH \times KACC \times HACC)$	0.1680

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.

20 Industrial sector: 1995−2003, output is GVA

20.1 Production function

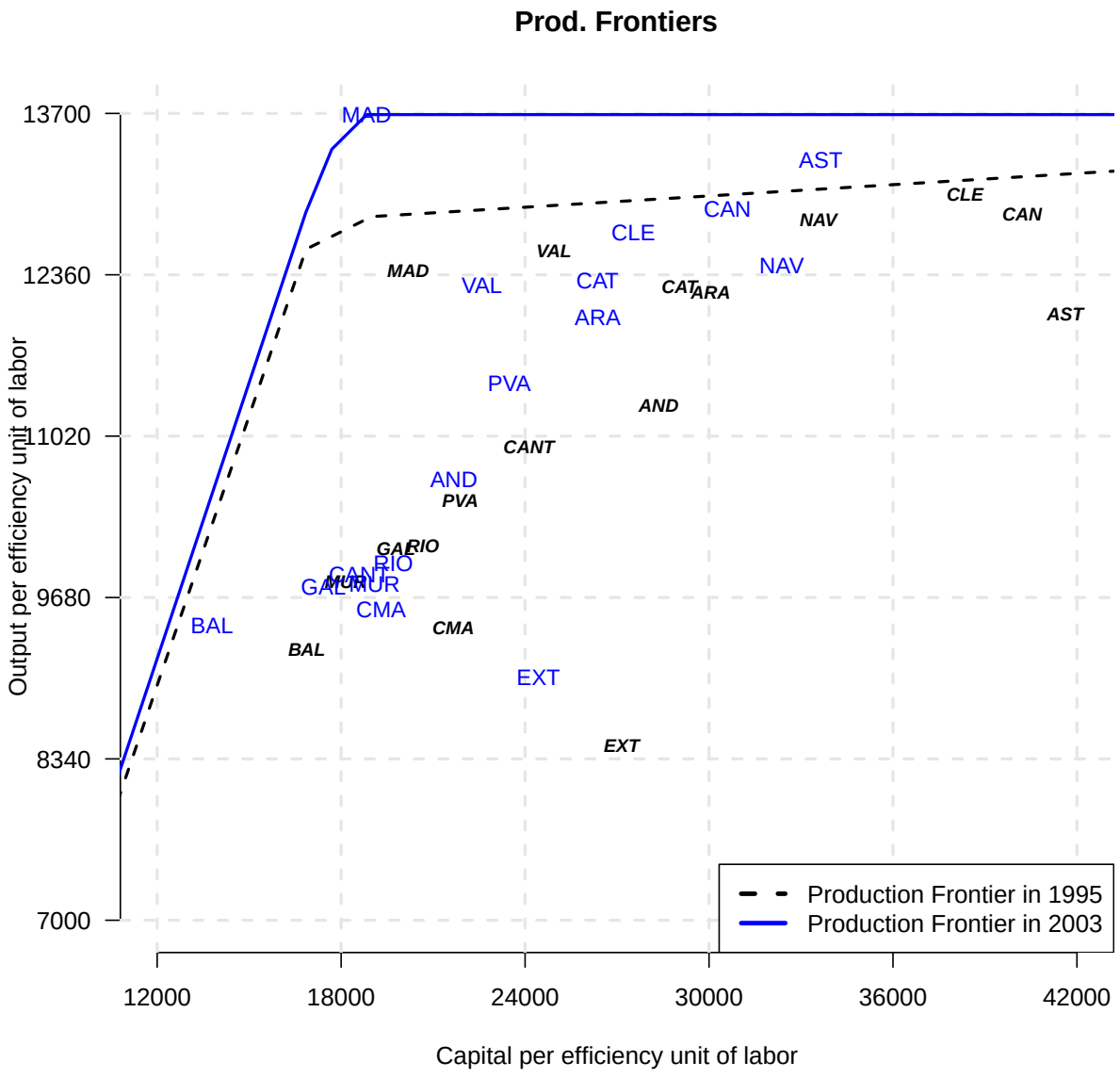

Figure 120: Production frontiers in 1995 and 2003

Notes: The bold italic abbreviations show the 1995 observations and the normal font abbreviations show the 2003 observations. The dotted line represents the 1995 production frontier and the solid line presents the 2003 production frontier.

20.2 Table with decomposition results

Table 37: Efficiency scores and percentage change of quadripartite decomposition indexes, 1995−2003

#	Region	TE_b	TE_c	productivity change	EFF−1 × 100	TECH−1 × 100	KACC−1 × 100	HACC−1 × 100
1	Andalusia	0.87	0.78	2.4	-10.3	5.8	-0.3	8.2
2	Aragon	0.94	0.88	7.5	-6.5	5.4	-0.1	9.2
3	Asturias	0.91	0.97	21.8	6.6	4.2	-0.3	9.9
4	Balearic Islands	0.74	0.9	9.2	21.9	2.5	-12.6	0.0
5	Basque Country	0.98	0.94	11.6	-3.5	4.5	-0.4	11.0
6	Canary Islands	0.85	0.72	0.5	-14.4	6.2	-0.4	10.9
7	Cantabria	0.99	0.93	8.7	-6.3	4.8	-0.5	11.2
8	Castilla-La Mancha	0.73	0.7	11.6	-4.3	6.4	0.0	9.6
9	Castilla y Leon	0.94	0.9	10.7	-4.6	5.5	0.0	10.0
10	Catalonia	0.97	0.9	5.4	-7.7	6.0	0.0	7.8
11	Extremadura	0.65	0.66	23.3	1.1	5.7	0.1	15.3
12	Galicia	0.78	0.74	9.3	-5.9	5.6	-0.3	10.3
13	Madrid	0.96	1	19.5	3.7	6.6	0.2	7.9
14	Murcia	0.77	0.72	9.5	-7.1	6.4	4.6	6.0
15	Navarra	0.98	0.91	3.4	-7.4	4.8	0.1	6.5
16	Rioja	0.81	0.84	18.5	2.9	6.1	0.2	8.3
17	Valencian Community	0.79	0.73	8.7	-7.3	6.4	0.1	10.0
	average	0.86	0.84	10.7	-2.9	5.5	-0.6	8.9
	weighted average	0.88	0.84	9.3	-4.8	5.8	-0.2	8.9

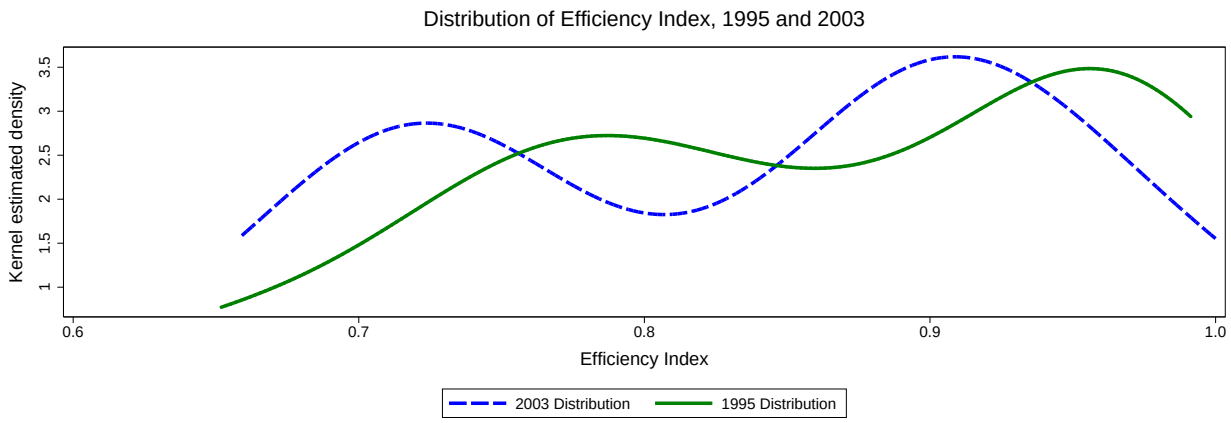

Figure 121: Distributions of efficiency scores in 1995 and 2003

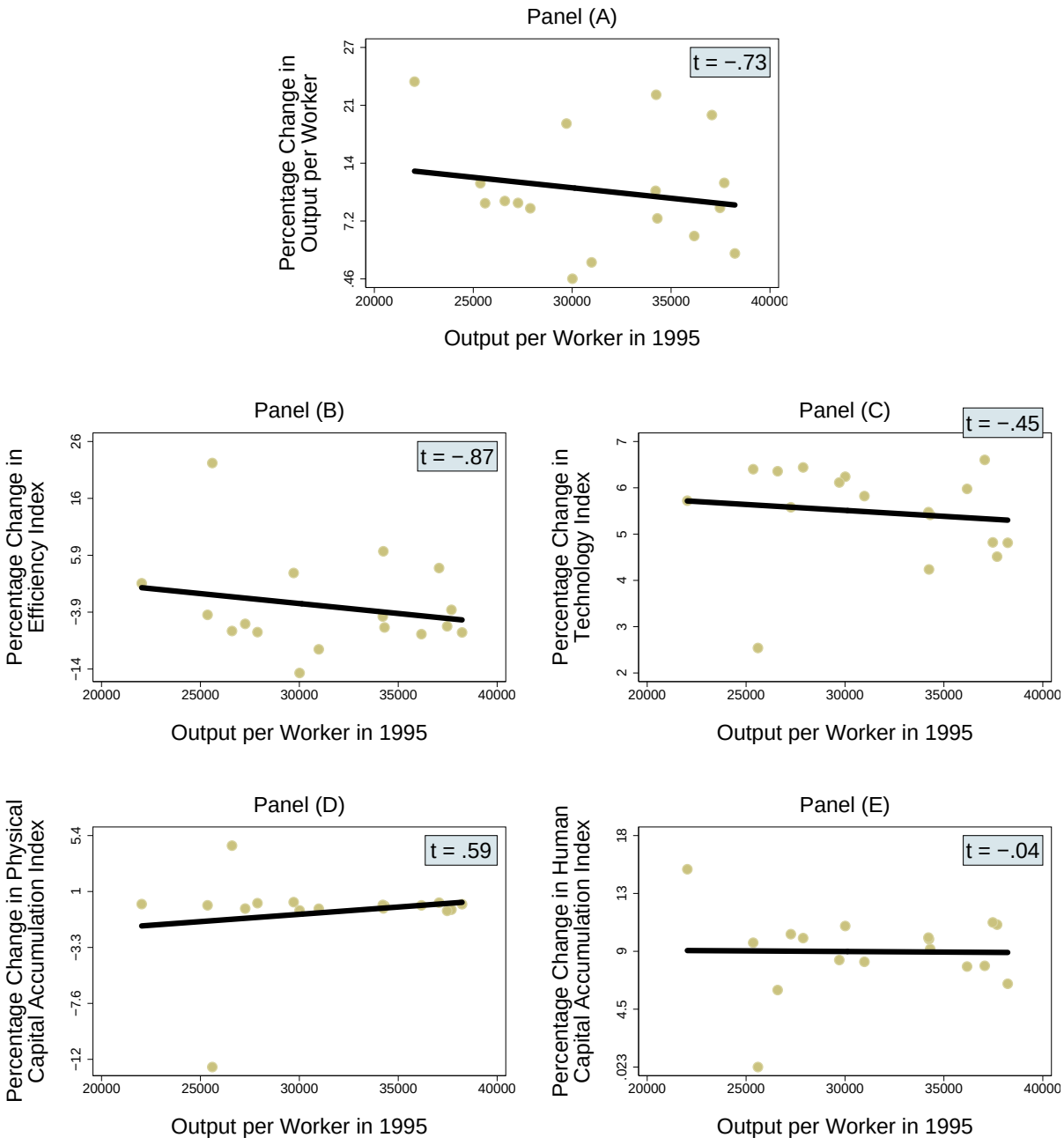

Figure 122: Percentage change (from 1995 to 2003) in output per worker and four decomposition indexes, plotted against output per worker in 1995

Note: Each panel contains a GLS regression line.

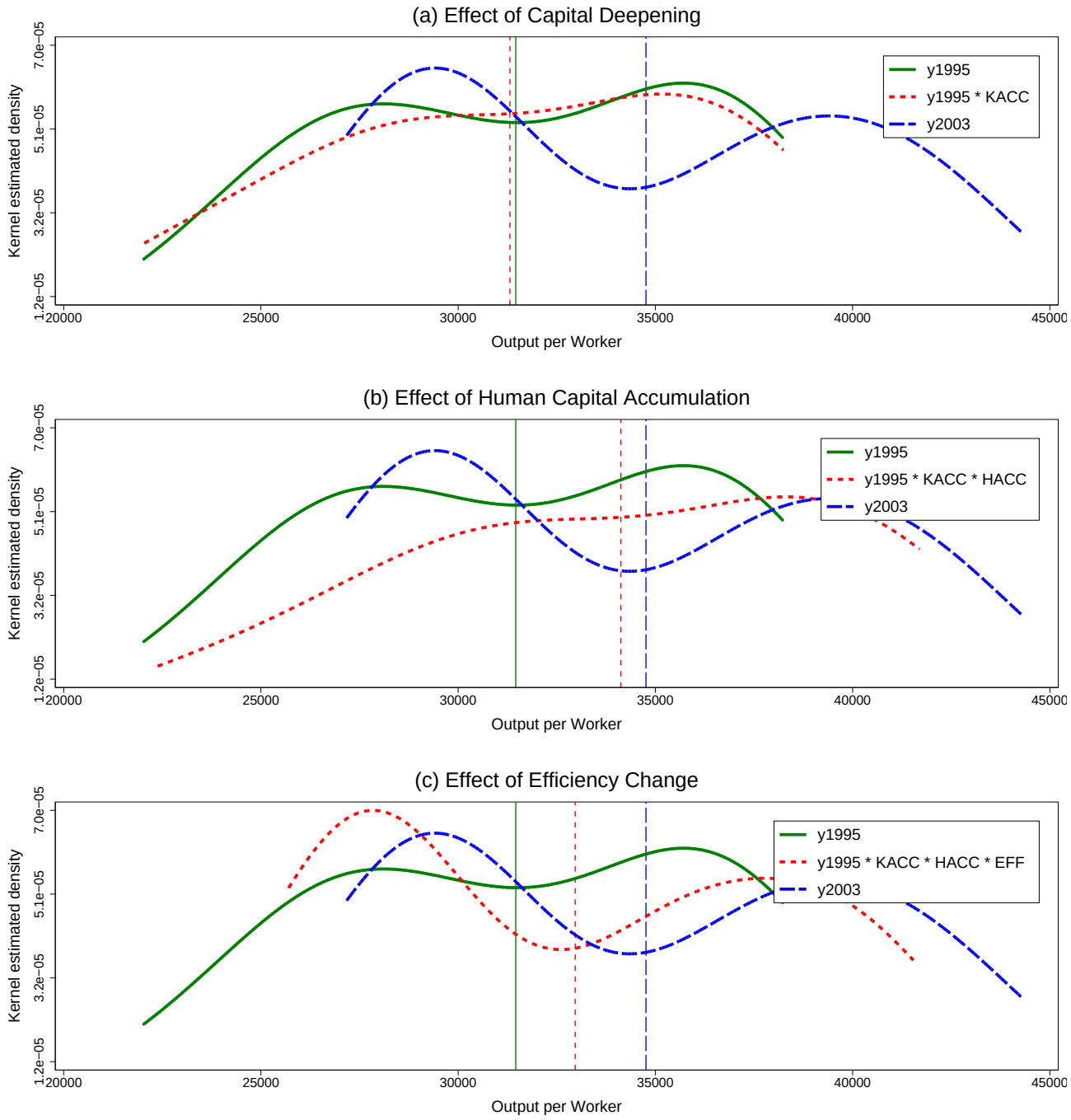

Figure 123: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, HACC, and EFF

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, human capital accumulation, and efficiency change on the 1995 distribution.

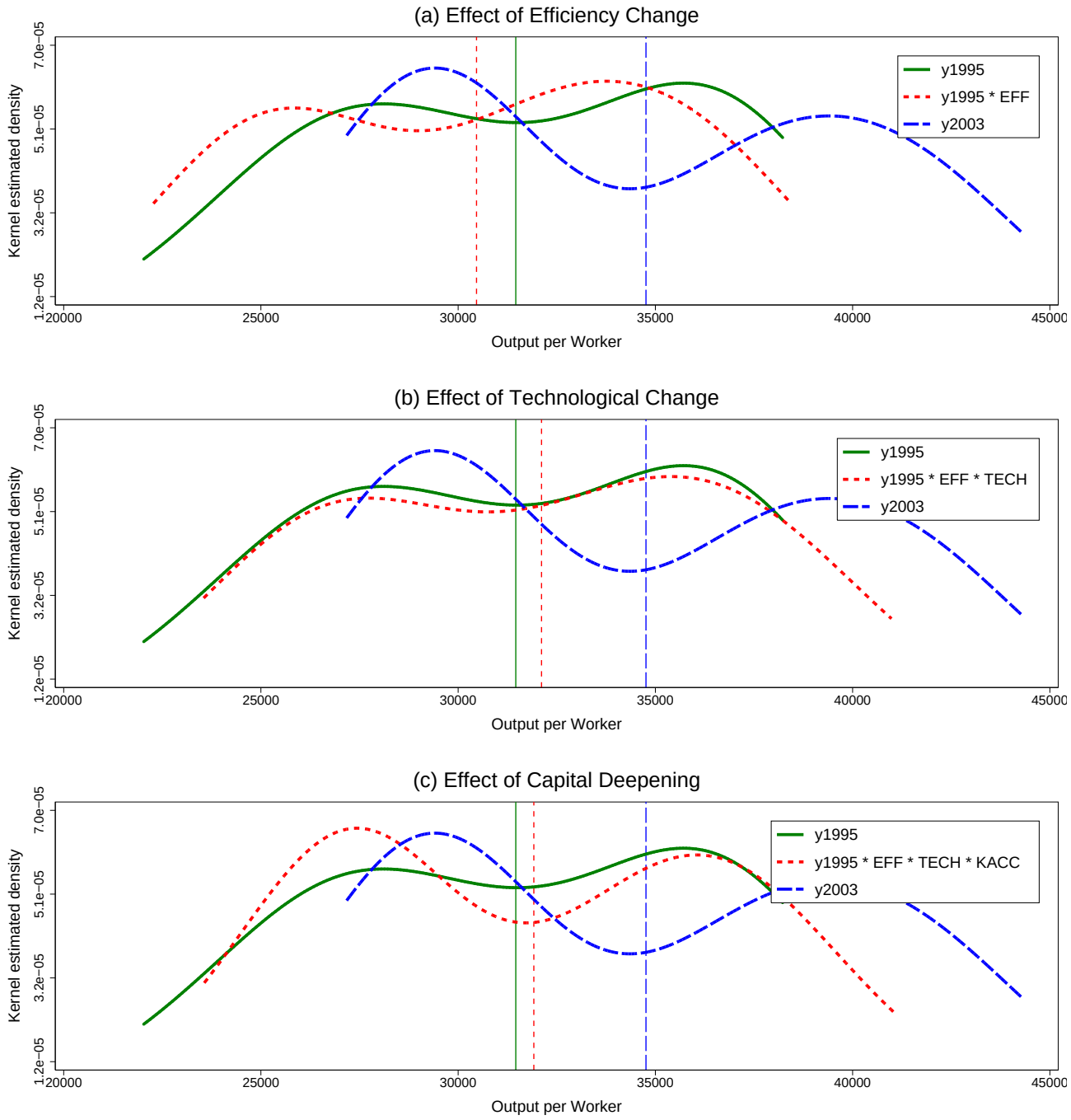

Figure 124: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: EFF, TECH, and KACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of efficiency change, technological change, and capital deepening on the 1995 distribution.

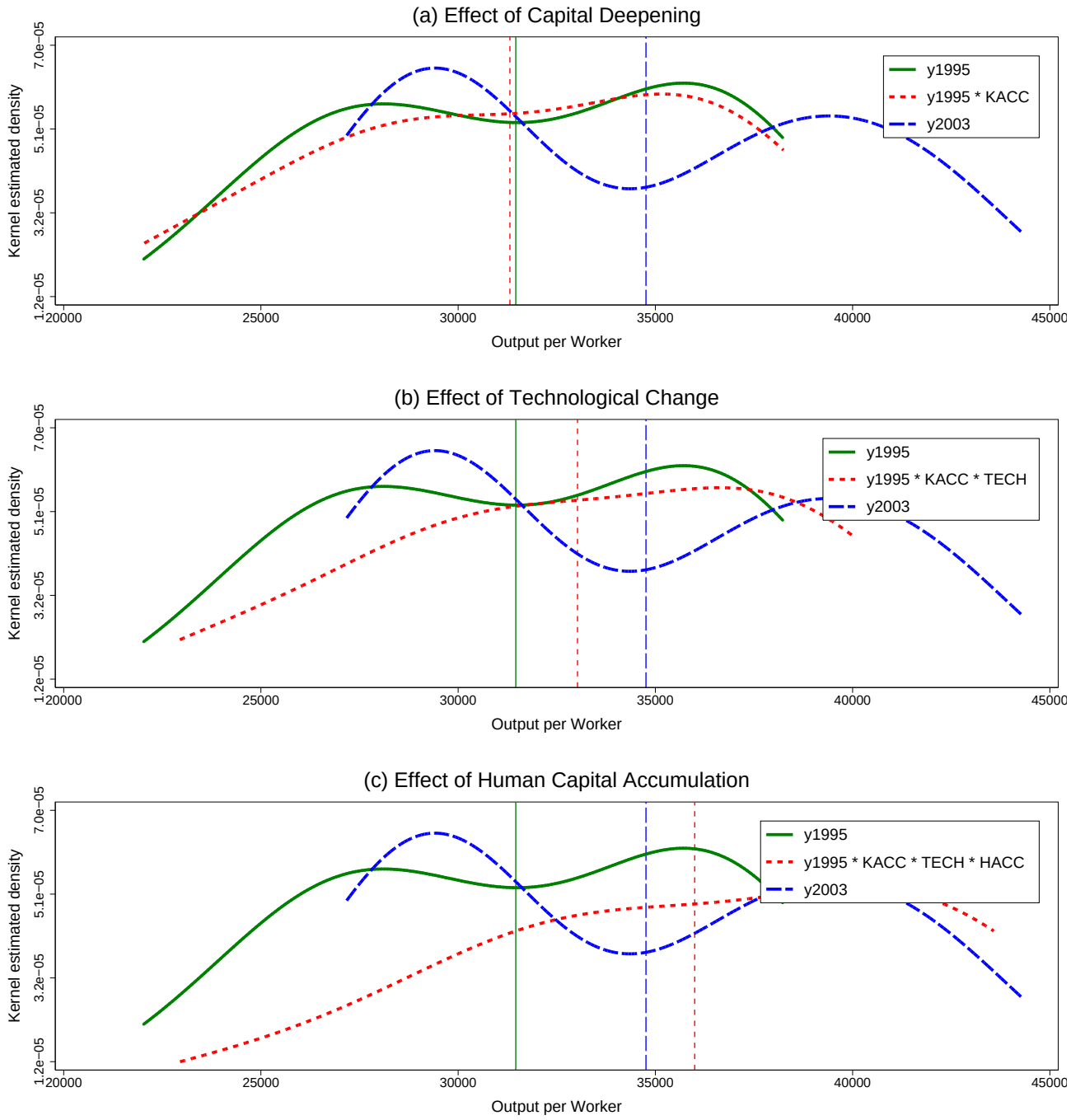

Figure 125: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: KACC, TECH, and HACC

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of capital deepening, technological change, and human capital accumulation on the 1995 distribution.

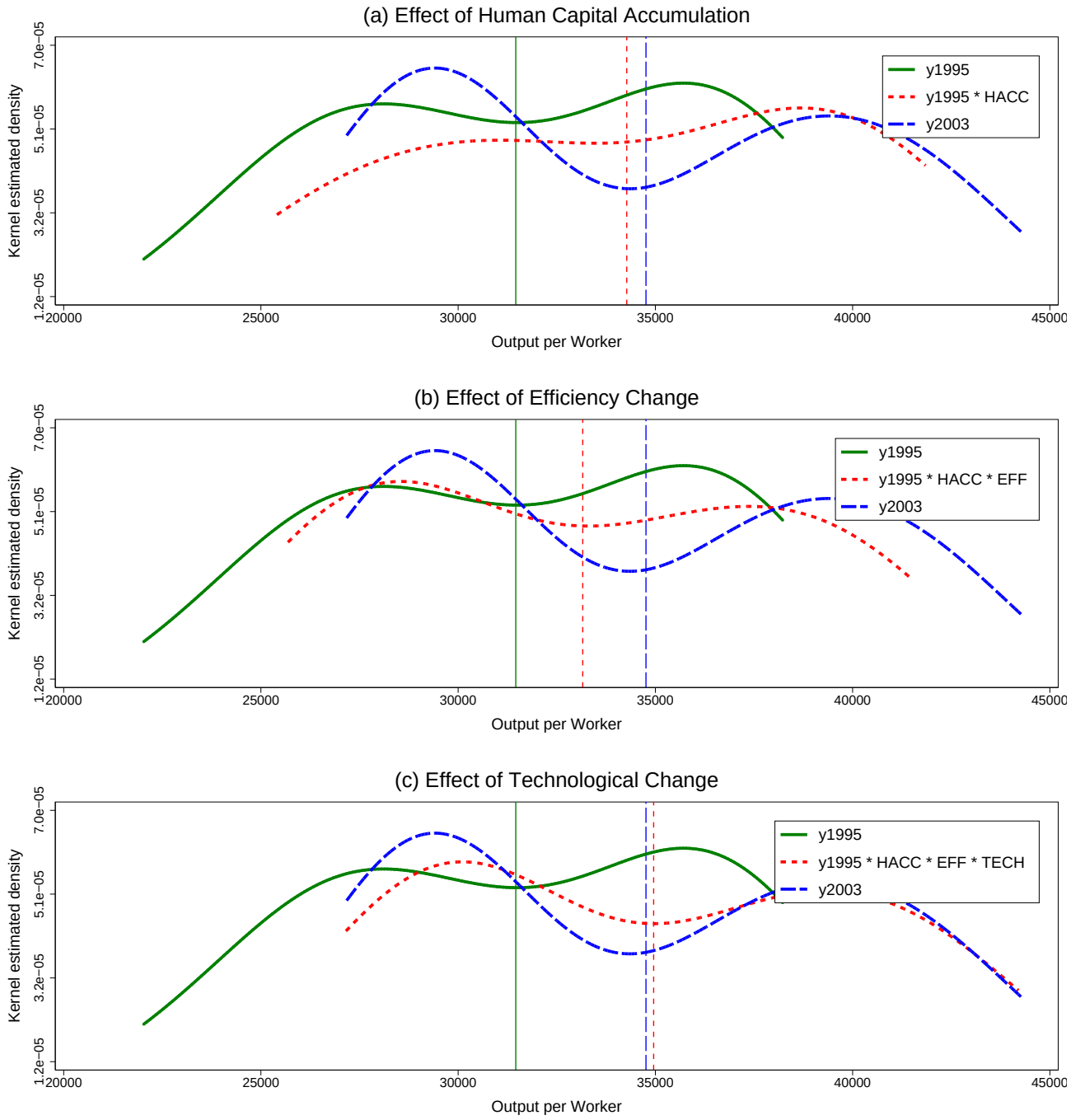

Figure 126: Counterfactual Distributions of Output per Worker. Sequence of introducing effects of decomposition: HACC, and EFF, TECH

Notes: In each panel, the solid curve is the actual 1995 distribution and the dashed curve is the actual 2003 distribution. The dotted curves in each panel are the counterfactual distributions isolating, sequentially, the effects of human capital accumulation, efficiency change, and technological change on the 1995 distribution.

Table 38: Distribution hypothesis tests (*p-values*)

	H_0: Distributions are equal H_1: Distributions are not equal	Bootstrap *p-value*
1	$g(y_{2003})$ vs. $f(y_{1995})$	0.2274
2	$g(y_{2003})$ vs. $f(y_{1995} \times EFF)$	0.0660
3	$g(y_{2003})$ vs. $f(y_{1995} \times TECH)$	0.8332
4	$g(y_{2003})$ vs. $f(y_{1995} \times KACC)$	0.2936
5	$g(y_{2003})$ vs. $f(y_{1995} \times HACC)$	0.9406
6	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH)$	0.4204
7	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC)$	0.0498
8	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times HACC)$	0.9614
9	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC)$	0.7196
10	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times HACC)$	0.8382
11	$g(y_{2003})$ vs. $f(y_{1995} \times KACC \times HACC)$	0.8898
12	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times KACC)$	0.3656
13	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times TECH \times HACC)$	0.9778
14	$g(y_{2003})$ vs. $f(y_{1995} \times EFF \times KACC \times HACC)$	0.7072
15	$g(y_{2003})$ vs. $f(y_{1995} \times TECH \times KACC \times HACC)$	0.5450

Notes: We used the bootstrapped (Li96) Tests with 5000 bootstrap replications and the (Sheather,Jones,1991) bandwidth.