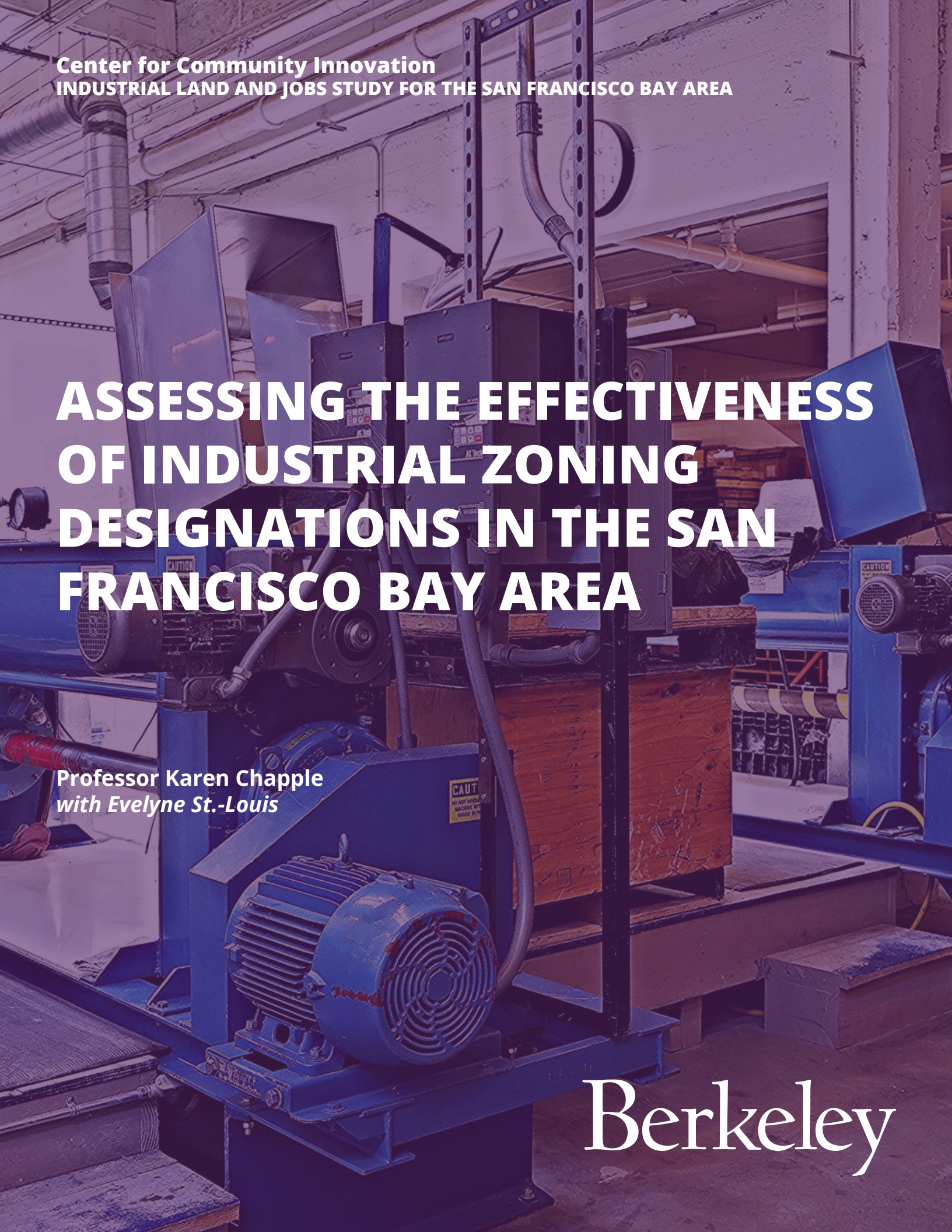

Center for Community Innovation
INDUSTRIAL LAND AND JOBS STUDY FOR THE SAN FRANCISCO BAY AREA

ASSESSING THE EFFECTIVENESS OF INDUSTRIAL ZONING DESIGNATIONS IN THE SAN FRANCISCO BAY AREA

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Report prepared for the Association of Bay Area Governments/Metropolitan Transportation Commission

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Contents

The Regional Industrial Land and Jobs Study complements the 2015 MTC Goods Movement Needs Assessment with an analysis of the demand for and supply of industrially zoned land in the nine-county region, both now and in the future. This Technical Memo analyzes the effectiveness of different industrial land (IL) zoning classifications at fostering employment growth.

Interviews conducted with cities across the region revealed that planning and economic development professionals considered certain zoning designations superior in their capacity to retain and prevent crowding out of industrial uses due to increasing rents or encroachment of non-industrial uses. According to locals, exclusively zoned IL (land zoned for only transportation or light, medium, or heavy industrial uses) is one of the most effective ways of controlling market forces, ensuring job growth, and influencing the type of businesses that locate in industrial areas. Although mixed-use IL offers more flexible use, new commercial and residential uses may be incompatible with industrial use and also raise local rents to unsustainable levels for small industrial firms. However, there is little systematic evidence or analysis on this issue.[1]

Therefore, this memo seeks to determine whether zoning makes a difference for employment growth on industrial land. Looking at Alameda, San Francisco, and Santa Clara counties, we compare how jobs are growing on exclusive and mixed-use IL, looking both at overall growth and growth just in production, distribution, and repair (PDR) industries.[2] As shown in Figure A, the overall patterns are the same across counties, but the specifics differ. Job growth rates are higher on industrial land than overall in all three areas, and San Francisco experiences particularly high job creation on its industrial land. The picture for PDR job growth is quite different, however, since these jobs are in significant decline in both San Francisco and Santa Clara counties. In the case of PDR, then, locating on industrial land seems to simply slow the decline. Only in Alameda County is the industrial land associated with PDR job growth. Not only are PDR jobs on industrial land growing as fast as the economy overall, but also locating on industrial land seems to reverse their overall decline.

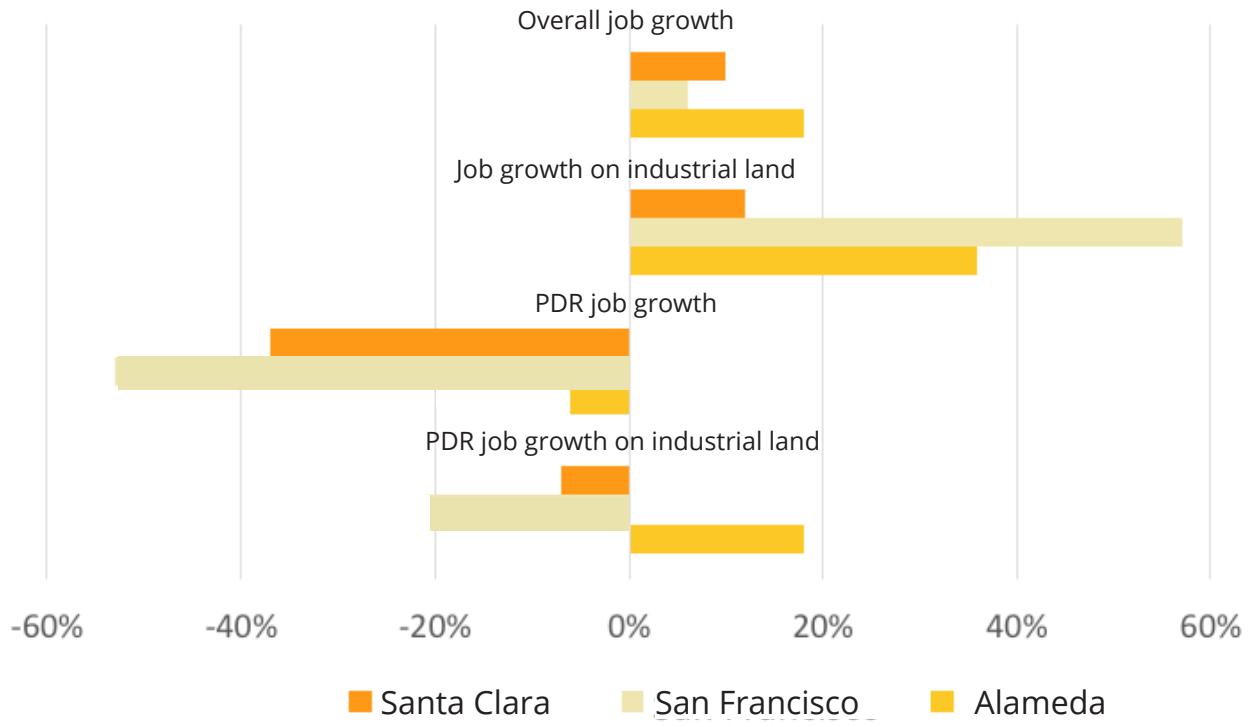

Figure A. Job and PDR job growth on industrial land and overall, selected counties.

Specifically, the analysis finds:

- Industrial land is the most productive land for job creation. Industries locating on IL grow at a faster rate than anywhere else.

- Job growth rates are particularly high in mixed-use zones. One reason for this is that MU IL allows for a relatively wider mix of activities (compared to exclusive IL), so these areas undergo the effect of being able to host very fast-growing industries, such as information, finance, real estate, professional, scientific, and technical service sectors.

- Industrial land supports job growth (and mitigates job decline) in PDR sectors. In San Francisco, land zoned for exclusively PDR use is most effective at mitigating the decline in its PDR sectors. The Alameda, medium and light IL seem to be fairly effective also at fostering growth of PDR sectors. In Santa Clara, mixed-use zoning is most effective.

- Specific types of zones work in different areas, depending on the local economy. In San Francisco and Alameda, medium and light industrial exclusive IL do well to foster positive job growth in PDR sectors (especially manufacturing sectors) that are otherwise declining in each of these counties. In other words, they allow for a space for these industries to grow where they otherwise cannot occur. However, In Santa Clara, MU IL zoning categories appear much more successful at enabling job growth for manufacturing and wholesale trade sectors than exclusive IL. Exclusively zoned land may work better to protect transportation and warehousing.

REPORT

PART I: INTRODUCTION

This technical memo is the fourth product from the *Regional Industrial Land and Job Study*, prepared for ABAG and MTC as a complement to the 2016 MTC Goods Movement Needs Assessment. In this fourth memo, we ask what types of zoning designations, if any, have been effective in encouraging employment growth in industrial sectors.

Interviews conducted with cities across the region revealed that planning and economic development professionals considered certain zoning designations superior in their capacity to retain and prevent crowding out of industrial uses due to increasing rents or encroachment of non-industrial uses. According to locals, exclusively zoned IL (land zoned for only transportation or light, medium, or heavy industrial uses) is one of the most effective ways of controlling market forces, ensuring job growth, and influencing the type of businesses that locate in industrial areas. Although mixed-use IL offers more flexible use, new commercial and residential uses may be incompatible with industrial use and also raise local rents to unsustainable levels for small industrial firms. However, there is little systematic evidence or analysis to support this.[3]

Therefore, this memo seeks to determine whether zoning makes a difference for employment growth on industrial land. Looking at Alameda, San Francisco, and Santa Clara counties, we compare how jobs are growing on exclusive and mixed-use IL, looking both at overall growth and growth just in production, distribution, and repair (PDR) industries.[4]

PART II: METHODS

ZONING AND EMPLOYMENT DATA

For the Regional Industrial Land and Jobs Study, we created a parcel-level inventory of industrially zoned land in the Bay Area. This inventory was prepared by gathering the most recent zoning maps from all 101 jurisdictions in the region, and by recoding city-specific zoning designations into seven industrial categories that we standardized for the region. These categories are: (1) heavy industrial, (2) medium industrial, (3) light industrial, (4) transportation and utilities—these are 'exclusive' industrial land (IL) categories—and (5) mixed-use commercial, (6) mixed-use residential, and (7) industrial office—these are "mixed-use" industrial land (MU IL) categories. These categories were then applied to county assessor data to build a parcel-level dataset of industrially zoned land. Field checks and feedback from local jurisdictions were used to verify the accuracy of the re-classified zoning maps.[5] One caveat is that we assume for this analysis of effectiveness over time that the zoning designation we apply to 2012 (i.e. most recent zoning codes we could gather from the 101 municipalities) was the same in 1990.[6]

We used the data from the National Establishment Time Series (NETS) database (data compiled from Dun & Bradstreet by Walls and Associates) linked to our parcel-level industrial land inventory to aggregate the number of jobs located on industrially zoned land (IL) in 1990 and in 2012. We included all jobs located on IL, regardless of NAICS sectors. For simplicity, we summarized these numbers at the 1- or 2-digit NAICS level. In tandem, we gathered the list of NAICS codes present on IL and calculated countywide job growth for these same sectors, and similarly summarized these at the 1- or 2-digit NAICS level.

We thus compared job growth on different types of IL zoning classifications from 1990 to 2012, to the overall job growth for the county from 1990 to 2012. The purpose is to determine which zoning classification, if any, performed better than others, or better than the county. We are particularly interested in determining which zones are successful in protecting production (and related) employment for which they were designed, rather than service employment. For the purposes of understanding industries likely to be located on industrially zoned land, we analyze more closely NAICS 31-33 (Manufacturing), 42 (Wholesale Trade) and 48-49 (Transportation and Warehousing), which are generally considered to be production, distribution, and repair (PDR) industries.[7] We also consider 23 (Construction) as a PDR industry for the sake of this memo.

Another caveat is that sectoral growth rates are influenced by factors much broader than just local zoning designations—indeed, national and international economic trends play a role in the growth and decline of industries over a 22-year time period. It is possible that even the best zoning designation could fail to "protect" a "doomed" industry. Nevertheless, in this analysis, we attempt to compare relative growth rates across different categories; if, within the same county, the industry is growing at different rates on certain types of land, there may well be local factors, such as zoning, at work.

COUNTIES ANALYZED

We perform the zoning effectiveness analysis at the county level for Alameda, San Francisco, and Santa Clara counties. We focus on these counties only for different reasons. First, interviewees from Oakland, Berkeley, San Jose, and San Francisco were some of the main advocates for zoning codes that include exclusively zoned IL, as a key enabler of industrial job retention and growth.

Furthermore, these three counties demonstrate differences in land use (Table 1), which provides a useful comparison to answer our main research question. On one end, San Francisco has a carefully crafted zoning classification that protects industrial land with its well-known PDR designations, and 50% of its 1,971 acres of IL is zoned exclusive IL. Santa Clara has a similar mix (53% of its 18,500 acres of IL are MU IL), but has actually opened up much of its IL to light- and heavy-office IL uses quite recently.[8] In contrast, Alameda's land is primarily exclusively zoned, with only about 15% of its 24,192 acres of IL zoned MU IL.

		Total IL	Exclusive IL	Mixed-use IL
ALAMEDA	Acres	24,192	20,656	3,535
	Percent	100%	85%	15%
SAN FRANCISCO	Acres	1,971	986	985
	Percent	100%	50%	50%
SANTA CLARA	Acres	18,500	8,661	9,839
	Percent	100%	47%	53%
BAY AREA TOTAL	Acres	96,696	65,793	30,903
	Percent	100%	68%	32%

Table 1. Industrial land (IL) zoning categories, by county

Lastly, while industrial land is much in demand across all three counties, they differ in terms of their markets. Over the last ten years, the most active and volatile markets for industrial land have been Alameda, Santa Clara and San Francisco Counties; yet, while the number of transactions is about equal in Santa Clara and San Francisco, Santa Clara outpaces all counties in terms of the total acreage of industrial land transacted over the last five years (4,000 acres). Alameda also displayed a large amount (3,150 acres). Gross rents for all industrial spaces in San Francisco and the Peninsula are higher than regional averages—whereas Alameda has more affordable rates, particularly for manufacturing and warehouse spaces. As discussed in Memo #1, economic restructuring, particularly the decline in traditional and even high-tech manufacturing, has transformed the San Francisco and Santa Clara economies particularly dramatically, while also impacting Alameda County. Finally, vacancy rates for industrial space are at all-time lows across all counties, and are particularly low for San Francisco and Santa Clara.[9]

PART III: FINDINGS

CROSS-COUNTY

The purpose of this analysis is to determine which zoning classification (exclusive vs. mixed-use), if any, performed better than others, and/or better than the county overall. We are interested particularly in which zones are successful in protecting production and related employment, for which they were designed, rather than service employment. As seen in Table 2:

- The rate of job growth on IL for all sectors present on IL is higher than the rate of job growth for those same sectors across the county—this holds true for all three counties. This is evidence that IL is the most productive zone for businesses: job growth is occurring, and at a faster rate than for the county as a whole.

- The employment growth rate on MU IL is higher than that on exclusive IL in Alameda and Santa Clara, and nearly similar in San Francisco. This is due at least in part to the concentration of high-growth, non-PDR industries on this land. This is an important point: a range of IL zoning classifications allow for growth of many different sectors, including non-PDR sectors.

- Exclusive IL makes some difference for sectors that are otherwise declining across the county. For example, PDR sectors—as shown in Table 2—are in decline across the county in Alameda, San Francisco, and Santa Clara. Nevertheless, these sectors are slightly more successful in certain zoning designations. In Alameda, for instance, exclusive IL does a good job at retaining job growth, as does medium IL in San Francisco. However, in other cases like Santa Clara, these zoning codes do not seem to make a difference in countering the overall sector decline.

In the following sections, we examine each county to uncover patterns at the 2-digit NAICS sectors, and discuss county-specific trends that might be influencing the relationship between land use zoning classification and employment growth.

		ALAMEDA	SAN FRANCISCO	SANTA CLARA
ALL SECTORS	County growth % (1990 to 2012 jobs)	**18%** *(420,827 to 495,830)*	**6%** *(399,767 to 422,358)*	**10%** *(684,716 to 756,391)*
	Growth on all IL % (1990 to 2012 jobs)	**36%** *(113,578 to 154,309)*	**57%** *(41,160 to 64,573)*	**12%** *(201,709 to 223,052)*
	Growth on exclusive IL % (1990 to 2012 jobs)	**27%** *(89,169 to 113,134)*	**54%** *(17,929 to 27,595)*	**0.2%** *(78,852 to 79,044)*
	Growth on mixed-use IL % (1990 to 2012 jobs)	**69%** *(24,409 to 41,175)*	**59%** *(23,231 to 26,978)*	**19%** *(122,857 to 146,008)*
PDR SECTORS	County growth % (1990 to 2012 jobs)	**-6%** *(166,750 to 156,413)*	**-53%** *(78,857 to 36,738)*	**-37%** *(332,636 to 208,199)*
	Growth on all IL % (1990 to 2012 jobs)	**18%** *(76,478 to 89,876)*	**-21%** *(20,268 to 15,971)*	**-7%** *(137,566 to 127,630)*
	Growth on exclusive IL % (1990 to 2012 jobs)	**15%** *(65,921 to 75,675)*	**-11%** *(12,180 to 10,855)*	**-16%** *(56,308 to 47,063)*
	Growth on mixed-use IL % (1990 to 2012 jobs)	**35%** *(10,557 to 14,201)*	**-37%** *(8,088 to 5,116)*	**-1%** *(81,258 to 80,567)*
	Growth on exclusive HEAVY IL % (1990 to 2012 jobs)	**13%** *(5,443 to 6,159)*	n/a	**-18%** *(18,726 to 15,350)*
	Growth on exclusive MEDIUM IL % (1990 to 2012 jobs)	**13%** *(41,619 to 46,838)*	**11%** *(5,422 to 6,019)*	**-9%** *(2,976 to 2,708)*
	Growth on exclusive LIGHT IL % (1990 to 2012 jobs)	**19%** *(18,165 to 21,679)*	**-28%** *(6,758 to 4,836)*	**-16%** *(34,599 to 29,005)*
	Growth on MU OFFICE IL % (1990 to 2012 jobs)	**2%** *(6,327 to 6,424)*	**41%** *(515 to 727)*	**-1%** *(75,414 to 74,811)*
	Growth on MU RES-COMM IL % (1990 to 2012 jobs)	**84%** *(4,230 to 7,777)*	**-42%** *(7,573 to 4,389)*	**-2%** *(5,844 to 5,756)*

Table 2. Employment growth in sectors present on Industrial Land (IL) categories

COUNTY OF SAN FRANCISCO

In San Francisco in 1990, the total sum of jobs located on industrially zoned land in 1990 was 41,160 jobs. In 2012, this number increased 57% to 64,573 jobs. In comparison, the county overall increased about 6% from its starting base in 1990 to 2012.

Table 3 provides an overview of job growth on industrially zoned land by zoning category. In San Francisco, we grouped zoning categories into four types: exclusively light, exclusively medium, mixed-use office and mixed-use residential or commercial. Each IL type experienced high growth from 1990 to 2012, ranging from 1,700 new jobs on mixed-use office, to 5,400 jobs on exclusive light, and up to 12,000 new jobs on mixed-use residential/commercial. Table 4 breaks down job growth by zoning category and by NAICS. For simplicity, we only show percentages.

San Francisco: Protecting industrial land through zoning

Beginning in the early 2000s on an interim (and then permanent) basis, San Francisco has protected its production, distribution, and repair (PDR) uses through zoning. PDR uses are zoned either as "protected" (exclusive, in zones that do not permit residential development), or simply "allowed" (mixed-use). According to a planning official, very few conversions have occurred in the PDR protected zones, which have successfully kept housing out. Because of high rents, “We would have no PDR if we had no PDR designation.”

In San Francisco, the market is strong enough that the city can impose specific requirements for industrial replacement. In certain strategic locations, for instance, the city is requiring industrial in tandem with office use, i.e., mid- to high-density office space above industrial uses. This way, office rents might even cross-subsidize the lower industrial rents for the developer. The city is thus leveraging the strong demand for residential/office uses in prime, high-rent locations to preserve, maintain or create industrial space. This would be suitable for artists and makers who have central location needs and compatible uses (i.e. non-noxious). For example, the Hundred Hooper Development in Mission Bay is planned as a large new PDR space (which was required to replace industrial land lost), which also incorporates office and commercial uses.

A few key patterns for San Francisco can be extrapolated from this data. To begin, although manufacturing sectors (31-33) declined markedly across the county, these sectors tended to do relatively well on light and medium industrial land. While Sector 32 declined drastically across the county, it only declined slightly on light industrial and actually grew rapidly on medium IL—while it declined in the mixed-use zones. While Sector 33 also declined across the county, it declined only slightly on light industrial and increased slightly on medium industrial. Interestingly, it also experienced very strong growth on both mixed use zoning categories

Growth patterns at the 3-digit level are also insightful. For example, for sector 321 (paper manufacturing), a county decline of 70% was outweighed by a 1444% (+520 net new jobs) growth on medium IL with an absence or limited growth on other IL; for sector 327 (nonmetallic mineral product manufacturing), a county decline of 57% was dwarfed by a 74% growth on light IL, despite a decline across other types of IL. For sector 315 (apparel manufacturing), although there was a small loss on light IL (-22%, or -49 jobs) and some growth on medium IL (24%, or +24 jobs), this contrasted with the marked job loss on both types of MU-IL (100% decline, or -74 jobs on MU-office, and 71% decline, or -697 jobs on MU-com-res). With wholesale trade (42), exclusive IL did well in providing space for this industry to grow. While the sector experienced a 46% decline

across the county, it grew 13% and 10%, respectively, on light and medium land—compared to a 5% and 15% decline on MU-office and MU-res-com, due perhaps to new warehouse uses. With the transportation sector (48), we see that in spite of a decline across the county, there was growth on MU IL, but decline on exclusive IL. This seems to be caused mainly by the marked decline of sectors 484 (truck transportation) and 485 (transit and ground passenger transportation), which combined, lost over 1,000 jobs on Medium IL, but gained modestly on MU-office (+180 jobs) and MU-res-com (+200 jobs), perhaps due to changes in these sectors, such as the use of lighter trucks. Finally, the postal, courier, and warehousing sectors (49) were in decline in all types of land and across the county, except on medium IL (1,099 new jobs).

Zoning classification	Employment 1990	Employment 2012	Absolute growth	Percent growth
Exclusive LIGHT IL	10,820	16,245	5,425	**50%**
Exclusive MEDIUM IL	7,109	11,351	4,242	**60%**
MU OFFICE IL	933	2,648	1,715	**183%**
MU RES-COMM IL	22,298	34,362	12,064	**54%**
ALL IL TOTAL	**41,160**	**64,606**	**23,446**	**57%**

Table 3. San Francisco job growth on Industrial Land by zoning classification

NAICS*	COUNTY	TOTAL ALL IL	LIGHT	MEDIUM	MU-OFFICE	MU-RES-COM
1	-46%	218%	-38%	-100%	0%	100%
21-22	-43%	1343%	200%	150%	0%	100%
23	-51%	51%	24%	42%	157%	96%
31	**-81%**	-56%	-20%	-61%	-83%	-68%
32	**-68%**	-62%	-30%	198%	-70%	-80%
33	**-80%**	12%	-7%	3%	35%	86%
42	**-46%**	3%	13%	10%	-5%	-15%
44-45	-4%	93%	174%	87%	164%	50%
48	**-71%**	-27%	-41%	-50%	197%	451%
49	**-50%**	-40%	-87%	658%	-77%	-58%
51 to 55	30%	142%	97%	112%	394%	153%
56	-8%	18%	184%	217%	107%	-21%
6	41%	129%	428%	127%	117%	98%
7	38%	75%	45%	97%	68%	83%
81	7%	58%	56%	125%	240%	34%
TOTAL	**6%**	**57%**	**50%**	**60%**	**183%**	**54%**

Table 4. San Francisco job growth on Industrial Land by zoning classification and by NAICS sector
*See county shift share files by county: list of unique 6-digit NAICS was extracted from NETS and those were used for projections.

Anchor Steam Brewery, San Franciscom, Photo Courtesy of Steve Wilhelm on Flickr

Beyond the industries we typically expect on IL, other industries have significant employment on industrial land and grew significantly from 1990 to 2012. For example, the retail trade sectors (44-45), although in decline across the San Francisco county, grew across all types of IL. Furthermore, the utilities (21-22) and construction (23) showed the same pattern, with a decline across the county, but growth on most types of IL. The information, finance, real estate, management, and professional, scientific, and technical services sectors (51-55) exhibited strong growth across the county, and even higher growth across all industrial zoning categories—especially on MU-office IL, which makes sense given the nature of this sector.

Overall, it seems like exclusively zoned IL in San Francisco has been relatively successful at ensuring continued growth of key PDR industries—in spite of countywide declines. Medium IL seems to have done particularly well in this regard for PDR sectors. More generally, exclusive IL seems effective at promoting all types of businesses—regardless of PDR sectors. It is possible that certain other types of zoning (such as mixed-use zoning) are not as conducive to business growth because of competition or conflicts with other uses.

ALAMEDA COUNTY

In Alameda, the manufacturing sectors (31-33) are in decline across the county, despite overall county job growth of about 18% from 1990 to 2012. Interestingly though, sectors 32 and 33 grew across all industrially zoned land. Furthermore, sectors 32 and 33 grew within each zoning type, except for sector 32 which declined on heavy IL. Certain zoning types did even better than others: for example, 33 experienced growth of 133% (1,422 jobs) on heavy IL, and sector 32 growth of 136% (2,309 jobs) on light IL and 360% (1,329 jobs) on mixed-use residential/commercial land. Sector 31, however, declined overall: The only zoning classifications with growth were medium IL (20%, or 310 jobs) and transportation/utilities IL (433% or 199 jobs).[10]

The case of wholesale trade (42), transportation and warehousing (48-49) was also different in Alameda as compared to San Francisco, because the county overall saw an increase in jobs in these sectors. Therefore, what we compare here is whether specific zoning designations allowed the industry to grow marginally more than in the county. In the case of wholesale trade, all zoning types were growing, with heavy, medium and light IL doing the best in terms of net new number of jobs (337, 615, and 558 jobs, respectively). For transportation and warehousing (48-49), growth occurred not so much on the transportation IL, but in the MU-res-com and light IL zoning types.

Oakland: Letting the market decide

As noted in Memo #2, West Oakland has undergone significant transformation, with steady job growth occurring but in industries that are not necessarily dependent on industrial land. Oakland has a long history of efforts to preserve industrial land, and since at least the early 2000s, has tried to develop an industrial land conversion policy. However, increasing housing pressure, urban design issues, and new zoning designations – for instance, the Housing Business Mix (HBX) designation in West Oakland – keep creating new challenges to preserving key industrial areas.

The West Oakland Specific Plan introduced a new HBX-4 classification that refines the City's density and permitted use requirements for live/work and work/live developments, and applies to several formerly commercial areas. In effect, though, it is just "pretend mixed use," as one city official said. Industrial and commercial development is not financially feasible, and the only new construction is residential. Although the West Oakland Commerce Association (WOCA) had argued that a zoning requirement of a 50/50 mix of residential and commercial/industrial uses would stabilize the area, the cap was not adopted. Given the higher financial returns for residential development, it is probable that the majority of these newly zoned parcels will be put to residential uses, further restricting the available industrial land in West Oakland.

For non-PDR industries, IL still seems to provide land for business growth. In sectors 51 to 81, all sectors grew countywide, and also grew on the vast majority IL zoning classifications—at even higher rates than the county at times. For example, for sectors 51 to 55 (which encompass information, finance, insurance, real estate, professional services, and management), both the absolute and percent job growth were very high across all IL categories (+3,700 jobs on medium IL, +339 jobs on heavy IL, +1,400 on MU-office and +1,700 on MU-res-com).

Overall, in Alameda, PDR sectors did better on all IL (MU and exclusive IL combined), than the county does overall. In terms of differentiating MU from exclusive IL, however, the patterns are not as marked as in San Francisco: although medium IL does seem to have fostered positive job growth across all PDR 2-digit industries, and light IL has been relatively successful, we also see that both MU-res-commercial and MU-office experienced, for most cases, positive growth. This, again, may reflect the ongoing restructuring of the economy in Alameda County.

Zoning classification	Employment 1990	Employment 2012	Absolute growth	Percent growth
Exclusive LIGHT IL	7,450	9,781	2,331	**31%**
Exclusive MEDIUM IL	54,223	68,422	14,199	**26%**
Exclusive HEAVY IL	26,505	33,458	6,953	**26%**
Exclusive TRANSPORTATION	991	1,473	482	**49%**
MU OFFICE IL	11,760	15,456	3,696	**31%**
MU RES-COMM IL	12,649	25,719	13,070	**103%**
ALL IL TOTAL	**113,578**	**154,309**	**40,731**	**36%**

Table 5. Alameda job growth on Industrial Land by zoning classification

NAICS	COUNTY*	TOTAL IL	HEAVY	MEDIUM	LIGHT	TRANSP	MU-OFFICE	MU-RES-COM
1	-33%	-58%	0%	-56%	-87%	0%	-84%	181%
21-22	-75%	39%	48%	18%	54%	0%	-100%	100%
23	-17%	20%	-6%	63%	7%	127%	-29%	35%
31	**-17%**	-3%	-38%	20%	-16%	433%	14%	-8%
32	**-2%**	46%	-65%	19%	136%	26%	36%	360%
33	**-21%**	16%	133%	8%	4%	24%	0%	67%
42	**5%**	11%	27%	7%	11%	77%	5%	40%
44-45	-1%	23%	-21%	16%	11%	46%	87%	18%
48	**14%**	17%	79%	1%	71%	-14%	-40%	126%
49	**36%**	37%	24%	3%	28%	-94%	274%	100%
51-55	48%	84%	102%	121%	23%	212%	130%	71%
56	4%	55%	53%	47%	132%	2750%	5%	43%
6	70%	130%	351%	204%	34%	-56%	-7%	319%
7	69%	114%	15%	164%	204%	100%	182%	45%
81	15%	33%	52%	11%	31%	-50%	47%	78%
92	N/A	126%	100%	57%	85%	0%	7671%	170%
TOTAL	**18%**	**36%**	**31%**	**26%**	**26%**	**49%**	**31%**	**103%**

Table 6. Alameda job growth on Industrial Land by zoning classification and by NAICS sector
*See county shift share files by county: list of unique 6-digit NAICS was extracted from NETS and those were used for projections.

SANTA CLARA COUNTY

In Santa Clara County, manufacturing sectors (31-33) were in decline across the county and all IL in particular, despite county job growth of 10% from 1990 to 2012. In fact, the only IL classification on which employment grew during this time period is on light IL—with a small 4% increase, or +41 jobs for sector 32; on medium IL where jobs in sector 31 stayed stable; and on MU-office IL, with an impressive 127% increase (+642 jobs) for sector 31. In fact, heavy, medium and light IL all had dramatic decreases in jobs for sectors 33 (a loss of 5,037, 441, and 6,751 jobs in each IL type, respectively)—comparatively to less dramatic decreases on mixed-use land (-697 jobs on MU-office and -497 jobs on MU residential/commercial).

Fremont: Zoning industrial land for mixed use, but with little risk of conversion

Readily accessible via BART, the City of Fremont is a key industrial area of the East Bay and Silicon Valley. The city supports its industrial firms and is focusing on the growth of advanced manufacturing. Furthermore, Fremont is now in a unique position because it will benefit from a new BART station in the foreseeable future. The Warm Springs BART station will be located in the southern end of the city, near the large existing Tesla plant. Intended as an employment-focused transit station, Warm Springs is located in a mixed-use industrial zone.

Despite other commercial, office, and residential uses that are planned to be co-located nearby, city officials argue that this industrial land is not at risk of conversion. The key to this lies in the type of industry and the type of zoning allowed in the station area plan:

- Industries with mid- to high-density employment on-site are the types of firms that will occupy land closest to the station. Similarly, firms that locate near the station (such as advanced manufacturers) will require limited use of truck freight and have very limited environmental impact (toxicity, noise etc.).
- Planning tools and zoning are being leveraged to control the risk that residential uses will outbid industrial uses. A cap on both the number of housing units and on residential land area will be applied, and performance-based zoning is planned for implementation for the area surrounding BART.
- The physical integration of industrial buildings within the rest of the fabric also matters to the success of an employment-transit area: although industrial uses are kept mainly separate from other uses (commercial and residential) and they are not located directly adjacent to BART, they are still within ¾-miles or less from the station. Different land uses are scaled up by density as distance to the station decreases, but all within a tight perimeter around the station. Furthermore, larger boulevards and BART tracks act as buffer areas between the industrial areas and the residential/services areas.

This shift is perhaps not surprising. Since 1990, much of Santa Clara's high-tech manufacturing has shifted to offshore locations, reducing the need for exclusively zoned IL. It is plausible that MU office IL is most effective for job growth in the South Bay given the presence of Silicon Valley and the existing active cluster of tech industries—which perhaps need flexible space (office plus R&D) to thrive.

For wholesale trade (42), again, the picture is not clear. This sector grew across the county; and while heavy and medium IL seem somewhat effective with their low growth rates, light IL does not with a 12% decline (-366 jobs). But most of all, the highest growth in absolute numbers actually occurs on MU office and MU residential/commercial. For transportation and warehousing (48-49), MU IL types

overall do not perform as well as the exclusive IL types—both 48 and 49 are positive across heavy, medium, and light IL, but negative on all MU IL, except for 49 on MU-res-comm.

In terms of growth of non-PDR sectors, both MU IL zoning seem to be doing well—and perhaps better than exclusive IL. For instance, from sectors 51 to 82, there was practically no decline in jobs on both MU-office and MU-res-com, whereas a few instances do show decline on heavy, medium and light IL for these sectors.

Zoning classification	Employment 1990	Employment 2012	Absolute growth	Percent growth
Exclusive LIGHT IL	24,481	25,899	1,418	**6%**
Exclusive MEDIUM IL	8,091	6,852	-1,239	**-15%**
Exclusive HEAVY IL	46,270	46,221	-49	**0%**
Exclusive TRANSPORTATION	10	72	62	**620%**
MU OFFICE IL	111,888	132,306	20,418	**18%**
MU RES-COMM IL	10,969	13,702	2,733	**25%**
ALL IL TOTAL	**201,709**	**225,052**	**23,343**	**12%**

Table 7. Santa Clara job growth on Industrial Land by zoning classification

NAICS	COUNTY*	TOTAL IL	HEAVY	MEDIUM	LIGHT	TRANSP	MU-OFFICE	MU-RES-COM
1	-72%	-52%	-6%	-96%	471%	0%	76%	-67%
21-22	2%	-30%	-20%	-82%	100%	0%	-33%	167%
23	-25%	50%	57%	35%	55%	0%	45%	48%
31	**-57%**	-20%	-65%	0%	-59%	0%	127%	-49%
32	**-64%**	-8%	-16%	-46%	4%	0%	-3%	-10%
33	**-65%**	-14%	-57%	-41%	-24%	0%	-1%	-34%
42	**66%**	4%	11%	6%	-12%	-100%	7%	3%
44-45	-3%	70%	45%	212%	57%	0%	79%	36%
48	**16%**	-24%	14%	191%	396%	0%	-64%	-23%
49	**34%**	136%	185%	100%	825%	0%	-8%	411%
51-55	119%	42%	148%	32%	48%	0%	41%	-5%
56	16%	70%	81%	210%	19%	0%	119%	90%
6	60%	71%	184%	-81%	89%	0%	277%	93%
7	86%	76%	-26%	96%	122%	100%	112%	11%
81	7%	42%	31%	-8%	56%	-33%	57%	38%
92	N/A	55%	125%	0%	151%	100%	6%	100%
TOTAL	**10%**	**12%**	**6%**	**-15%**	**0%**	**620%**	**18%**	**25%**

Table 8. Santa Clara job growth on Industrial Land by zoning classification and by NAICS sector
*See county shift share files by county - list of unique 6-digit NAICS was extracted from NETS and those were used for projections.

PART IV: DISCUSSION

Photo Courtesy of Thomas Hawk on Flickr

This analysis suggests some support for the idea that exclusive IL might be one of the most effective ways of controlling market forces, ensuring industrial job growth, and influencing the type of businesses that locate in industrial areas. However, the effectiveness of industrial zoning depends on local context. There is not a generalized clear distinction between what zoning types (exclusive vs. mixed-use IL) distinctively encourage job growth. Exclusively zoning for industrial use, which is considered the most protective, succeeds in preserving businesses—fostering job creation or stanching job loss—in San Francisco and Alameda counties, but in Santa Clara county, jobs thrive best in mixed-use zones. Further analysis, such as multivariate regression, would be needed to determine whether type of zoning matters regardless of larger trends such as economic restructuring.

Nevertheless, several trends can be discerned:

- Industrial land is the most productive land for job creation. Industries locating on IL grow at a faster rate than anywhere else.

- Job growth rates are particularly high in mixed-use zones. One reason for this is that MU IL allows for a relatively wider mix of activities (compared to exclusive IL), so these areas undergo the effect of being able to host very fast-growing industries, such as information, finance, real estate, professional, scientific, and technical service sectors.

- Industrial land supports job growth (and mitigates job decline) in PDR sectors. In San Francisco, medium industrial land zoned for exclusively PDR use is most effective at mitigating the decline in its PDR sectors. Alameda, medium and light IL seem to be fairly effective also at fostering growth of PDR sectors. In Santa Clara, mixed-use zoning is most effective.

- Specific types of zones work in different areas, depending on the local economy. In San Francisco and Alameda, medium and light industrial exclusive IL do well to foster positive job growth in PDR sectors (especially manufacturing sectors) that are otherwise declining in each of these counties. In other words, they allow for a space for these industries to grow where they otherwise cannot occur. However, In Santa Clara, MU IL zoning categories appear much more successful at enabling job growth for manufacturing and wholesale trade sectors than exclusive IL. Exclusively zoned land may work better to protect transportation and warehousing.

NOTES AND APPENDICES

NOTES

1. One exception is a study of industrially zoned land in the East Bay, which found that it is associated with higher levels of job creation. See Karen Chapple, "The highest and best use? Urban industrial land and job creation." Economic Development Quarterly 28.4 (2014): 300-313.
2. We based the list of industries in the PDR sector on the designations by the San Francisco Planning Department. See ...
3. One exception is a study of industrially zoned land in the East Bay, which found that it is associated with higher levels of job creation. See Karen Chapple, "The highest and best use? Urban industrial land and job creation." Economic Development Quarterly 28.4 (2014): 300-313.
4. Because we are constrained to working at the 2- and 3-digit NAICS level, we define the PDR sector as NAICS 23 (Construction), 31- 33 (Manufacturing), 42 (Wholesale Trade) and 48-49 (Transportation and Warehousing).
5. More details on these methods and findings are included in Memo 1.
6. This analysis assumes that the zoning is constant. However, it is possible that industrial land in 2012 was zoned for other uses in 1990, or that mixed-use industrial land has been converted to exclusive industrial, or that exclusive industrial land has been converted to mixed-use. Based on our interviews, the only place that mixed-use industrial land has been converted to exclusive industrial is probably San Francisco; in the other counties, there has instead been a shift in the opposite direction, from exclusive to mixed-use. In general, the most likely zoning change is from industrial to residential or commercial – in which case, the businesses would not be included in our data. Thus, this analysis likely yields relatively conservative results – i.e., by not including jobs on land converted to non-industrial zoning it is underestimating the amount of job growth.
7. We break these to the 3-digit level, but due to small employment numbers in some categories, we do not use the 3-digit level systematically, and mainly stay with the 2-digit level.
8. Based on interview with City of San Jose Economic Development staff, March 2016.
9. See Memo 1 for more details on methods and numbers.
10. Mixed-use office is positive at 14% increase, but this only represents about 65 jobs.
11. numbers and excluded too many industries considered dependent on industrial land.
12. At the time of analysis, this was the only scenario available for study. The final version of the scenario differs slightly from the one studied here.