En Rezago. Las Áreas Metropolitanas del Interior de California

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Resumen

Entre 1969 y 2004 el salario promedio en las poblaciones costeras de California creció mucho más rápidamente que las del interior del estado. Este artículo muestra esta brecha y la asocia con niveles de educación y cambio industrial. Se muestra que el porcentaje de ingresos derivado de actividades relacionadas con la producción tradicional de bienes disminuyó tanto en las áreas costeras como en las del interior entre 1969 y 2000, pero que el porcentaje de ingresos de actividades de la industria informática, así como el porcentaje de individuos educados –quienes son un insumo crucial para estas actividades-aumentó durante este mismo periodo. Se argumenta también que inmigración no tuvo ningún impacto en los salarios metropolitanos.

Falling Behind: California's Interior Metropolitan Areas

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Abstract

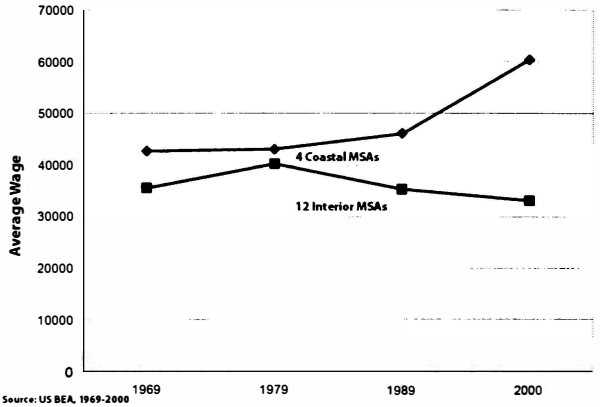
From 1969 to 2004 average wages on California's coast grew much faster than those in its interior. In this article, we document this wage gap and link it to education and industrial change. We show that the share of earnings from traditional goods production activities fell on both the coast and in the interior from 1969 to 2000, but that the share of earnings from information-based activities—and the share of educated people who are the crucial inputs to those activities—rose much more on the coast over the same period. We also show that the wage returns to skill were higher on the coast during this time, which could reflect agglomeration effects or simply the attraction of more productive people to the coast. Immigration had no impact on the metropolitan wage.

From 1979 to 2004 real wages in the inland agricultural areas of California suffered a marked economic deterioration relative to California as a whole, and in particular relative to California's large coastal metropolitan areas. In this paper we document that relative decline and investigate possible explanations for wage divergence in California over the same period. We concentrate on 12 inland metropolitan statistical areas (MSAs) that at first glance would not seem to be candidates for economic distress. Eleven of these 12 areas compose one of the most prosperous and productive swathes of farmland in the United States, if not the world. The San Joaquin Valley, which comprises eight of these metropolitan areas, exports more agricultural products than any U.S. state other than California. And all 12 of these MSAs have been growing rapidly in population.

Yet compared to both the state and the large coastal metropolitan regions of Los Angeles, San Diego, San Francisco and San Jose, real wages in these 12 MSAs are falling behind. Even as their populations have boomed their wages have stagnated, and in some cases actually declined in real terms. At the end of the 1970s, these areas lagged behind the rest of California, and in the intervening years the gap between these areas and the rest of the state continued to widen. To be sure, it is not a surprise that wages in small metropolitan areas (all of the 12 interior MSAs have populations well under one million) are less than wages in large ones. Larger places have greater congestion, longer journeys to work, and higher land prices, all of which raise the cost-of-living and exert upward pressure on wages (O'Sullivan 2007). But in the period after 1979, the difference between average wages in the interior and the coast grew sharply. Figure 1 shows that from 1969 to 1979 real average wages for the 12 interior places in our study were low but moving in line with real average wages in the four coastal metropolitan areas. In the 1980s, however, real wages on the coast and in the interior began to diverge, and in the 1990s the gap widened dramatically. It is this growing gap that we seek to explain.[1]

[1] The pattern of wage growth and decline across California places is evocative of the argument that wages and income are both diverging, rather than converging, across states and metropolitan areas (Barro and Sala-i-Martin 1991; Drennan and Lobo 1999). But convergence and divergence are national (or global) phenomena; we have no reason to expect that incomes will converge into equilibrium over a single state, so the standard literature on convergence is of little help.

Figure 1: Average Wage Levels in Coastal and Interior California, 1969-2000 (2004 Dollars)



For most of this analysis we use the average annual wage as our metric, as reported by the Bureau of Economic Analysis, Regional Economic Accounts, for all MSAs. This is the wage per job, including full-time and part-time jobs, and excluding the self-employed (proprietors and partnerships). We use the average wage because wages are the largest and most explicitly spatial component of personal income, and personal income is in turn a good (albeit imperfect) measure of material well-being. Disparities in income, therefore, are in many ways the result of disparities in wages, so understanding wage divergence helps us understand why people in some locations are materially better off than people in others. [2]

Our analysis is organized as follows: in the next section we discuss possible explanations for the growing wage differences across California, and pay particular attention to the importance of education and industrial change in determining those differences. In Section III we show descriptively that the coastal and interior MSAs in California have transitioned at different paces into the "knowledge" or "information" economy, and in Section IV we show that the same pattern holds for levels of educational attainment. In Section V we carry out simple empirical tests, and in Section VI we conclude.

[2] The trends of average real wages for the interior versus the coast, shown in Figure 1, are mirrored by the trends in per capita personal income (not shown). There is, of course, no single measure of economic well-being, either for individuals or regions: in addition to income and wages, researchers have used in-migration rates, poverty rates and employment rates as metrics for the health of a regional economy. See Bartik, Boehm and Schlottman (2003) for a discussion.

Possible Sources of the Wage Gap

The twelve metropolitan areas that are the focus of this article are shown in Table 1. In 1969, all 12 of these MSAs had a lower average real wage than California. Of the four coastal MSAs, all but San Diego had a higher average real wage. In the next three decades the wages of all 12 MSAs grew more slowly than the California and national average, while in three of the four coastal MSAs—Los Angeles is the exception—wages grew faster than the state and national average. Average real wage growth in the 12 interior MSAs was -2.1 percent, while in the four large coastal MSAs it was 36 percent.

Table 1: Average Wage and Population by Place, 1969-2003

Place	Wage 1969	Wage 2004	Population 1969	Population 2004	% Change in Wage	% Change in Pop.
California	37,804	44,039	19,711,000	35,841,254	16.5	81.8
Los Angeles	39,957	44,756	8,366,706	12,901,515	12.0	54.2
San Diego	33,472	41,883	1,340,989	2,933,929	25.1	118.8
San Francisco	40,333	55,236	3,088,491	4,148,637	36.9	34.3
San Jose	41,666	68,665	1,051,545	1,741,521	64.8	65.6
4 Large MSAs*	38,857	52,635	3,461,933	5,405,565	35.5	56.1
Modesto	30,543	31,464	191,271	497,231	3.0	160.0
Hanford-Corcoran	27,820	29,976	65,647	142,187	7.7	116.6
Fresno	30,209	29,847	408,304	865,468	-1.2	112.0
Merced	27,270	27,392	101,255	236,774	0.4	133.8
Madera	26,055	27,361	41,079	138,895	5.0	238.1
Visalia-Porterville	26,235	25,887	185,701	400,940	-1.3	115.9
Bakersfield	33,214	32,051	325,549	733,784	-3.5	125.4
Stockton	33,868	32,652	284,769	649,338	-3.6	128.0
Yuba City	31,073	30,587	86,435	151,193	-1.6	74.9
Chico	30,847	27,432	101,057	212,609	-11.1	110.4
Redding	35,165	29,698	76,290	177,608	-15.5	132.8
El Centro	26,940	27,467	73,604	152,167	2.0	106.7
12 Interior MSAs*	29,937	29,318	161,747	355,482	-2.1	119.8

Note: All Dollars 2004. * denotes a simple average. Percent change in population is for the sum of population.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts

Why might this have happened? The old joke about California is that it is actually two states masquerading as one—the urbanized coast and the agricultural interior—and the wage data suggests that in the last decades of the twentieth century, these quite different places became less rather than more alike. A further puzzle is that falling wages are often associated with outmigration (Drennan 2008), but people are flowing *into*, rather than out of, California's interior MSAs. Table 1 also shows that the interior MSAs have outstripped the coastal MSAs in population growth. The interior MSAs grew, on average, by 125 percent from 1969-2004, while the coastal MSAs grew by less than half that, at 57 percent. In part, this difference is an artifact of the large differences in population between the coastal and interior regions: all four coastal MSAs have well over one million residents, while none of the interior places do, as they range in population from 142,000 (Hanford-Corcoran) to 865,000 (Fresno). Nevertheless, the population growth in the interior is striking, given the slow wage growth over the same period.

So what can account for not just California's wage divergence, but also for its peculiar form, characterized by sharp increases in population even as wages stagnate or decline? Four factors may have played a role:

1. *Population.* Economists have long recognized that large places have advantages over small ones. Gunnar Myrdal (1957), in his cumulative causation growth model, argued that larger places have initial advantages that lead to self-sustaining growth. In core-periphery models, an initial concentration of economic activity at the core is not easily overcome by the periphery (Krugman 1991; Fujita *et al* 2001). Scale economies and agglomeration economies also favor larger places, pushing up labor productivity and thus wages (Henderson, 1988). Adam Smith noted that market size, which is highly correlated with population, permitted industrial specialization: "There are some sorts of industry..." he wrote, "which can be carried on nowhere but in a great town." (Smith 1776, p. 17). Size allows specialization because large places have bigger consumer and labor markets, and because large populations allow for ease in the coordination of talent (Becker and Murphy 1992). Specialization, in turn, better enables learning and expertise, and these facilitate the transmission of ideas (Anas, Arnott and Small 1998). We discuss this more below.

2. *Industrial Specialization.* The set of industries that stimulate wages and those that depress wages changes over time (Detroit once prospered

because it manufactured automobiles; now it suffers for the same reason). In the period that we examine, the California economy, like the national economy, underwent a significant transition, shifting away from the production of goods and toward the production of information and ideas (Glaeser 1994). This transition from "mill-based to mind-based" economic activity resulted in a decreased emphasis on many traditional urban industries, such as manufacturing, and an increased emphasis on non-routine service sector work that requires formal higher education, such as law, medicine and the arts. These latter industries, which have been dubbed the "knowledge" or "information" economy, differ from older goods-based urban industries in the types of jobs they offer, the level of the wages they pay, and the requirements for employment in them (Drennan 2002). At the national level, almost half the jobs in the knowledge industries are managerial, professional or technical, and require at least a bachelor's degree (Drennan and Lobo 2008). These jobs also tend to pay well (McCall 1998), either as a result of greater efficiency, or—as James Galbraith (1998) has argued—because some knowledge sector firms have quasi-monopolistic power that enables them to reward their workers with wage premiums. For our purposes the important fact is that in California, the transition into the knowledge economy has not taken place evenly. California has always had spatial disparities in both the location of knowledge industries and the college educated people they employ, and between 1970 and 2000 these discrepancies widened. It is not unreasonable to suspect that this disparity would play some role in the divergence of California's wages.

3. *Human Capital.* In the United States, individuals with a college education or higher earn better wages than those who have not completed college, and the premium paid to college graduates has been increasing over time (Levy and Murnane 1992; Katz and Murphy 1992). The reasons for this are numerous, but the favored explanation among economists is that technological change is "skill-biased"—it disproportionately benefits the educated. These effects could be compounded by the erosion of various institutions that have traditionally protected the wages of the less-educated; unionization rates have fallen steadily since World War II, for instance, and the real value of the minimum wage declined throughout the 1980s and 1990s (Card and DiNardo 2002; Lee 1999). In a spatial context, we can expect places with high proportions of educated residents to have higher average wages than places with low proportions of educated people (Drennan 2002; Glaeser 2004).

4. *Immigration*: Immigration's influence on wages is a source of both academic and popular debate (Borjas and Katz 2005; Card 2005;

> Lowenstein 2005). California has more immigrants than any other state, and perhaps more importantly it has more Mexican immigrants, and more undocumented immigrants, than any other state (at one point in the 1990s it was estimated that California had fully 43 percent of the nation's undocumented immigrants). Mexican immigrants in general, and undocumented Mexican immigrants in particular, lie at the heart of most debates about immigration's impact on wages. Intuitively, immigration offers an explanation for the simultaneous economic decline and population expansion in inland California. If poor immigrants from rural Mexico are drawn to the interior by the prospect of agricultural jobs, they could drive up the population while at the same time depressing the average wage. Yet it is not clear that immigration could reduce a region's average wage. Even those researchers who argue that immigration depresses wages do not argue that it drags down earnings in the entire regional labor market (Friedberg and Hunt 1995). Rather they worry that immigrants will depress the earnings of the unskilled native-born, such as high school dropouts (e.g., Borjas and Katz 2005). Even this assertion is controversial (Card 2005), but assuming there is some validity to it, immigration could decrease the wages of the low-skilled native-born and nevertheless *increase* the average wage region-wide. For example, immigrant domestic labor in some metropolitan areas enables native-born college educated women to increase their time commitment to work. If the gains to the skilled outweigh any losses to the unskilled, and the overall result is increased productivity, then the average wage could rise even as wages at the bottom fall.

All of these potential explanations overlap. Take, for instance, the hypothesis about industrial specialization. We could argue that the large coastal MSAs transitioned more successfully into the information economy, while the interior MSAs remained more specialized in relatively declining industries. This rather straightforward argument is, however, somewhat difficult to prove. The first problem is that industrial specialization is hard to measure. Although we can categorize some industries as information-based as opposed to goods-based, it is hard to tell with available data whether the earnings generated by those industries in any given place are *export-oriented*. It is standard practice in economic development analysis to assume that productivity and wage increases in a metropolitan area are largely determined by that area's ability to sell goods and services to outside individuals and firms.[3] Yet it is difficult to separate the export-oriented components of an industrial sector from the locally-oriented components. Earnings from law, for instance, could

[3] Not all researchers abide by this convention. Glaeser, et al. (1992), for instance, assume that all industries of significant size, such as retail trade and construction, can contribute to urban growth or its absence.

come from family attorneys doing local work or corporate lawyers who sell their services nationally or globally. The latter represents a movement into the knowledge economy; the former probably does not.

The second problem is that industrial structure is hard to separate from the other factors. Population size, as we have mentioned, often drives industrial specialization. And industrial specialization is itself tremendously difficult to disentangle from educational attainment, because to a strong degree industrial structure and labor force skill are jointly determined. The presence of skilled people can help incubate skilled industries, and the presence (or absence) of skilled industries helps determine both the skill levels of in-migrants (educated people flock to places with a high demand for skilled work) and the investments in skill that are made by locals. There are exceptions, of course: the skill level varies both within and across industries, so labor force skill does not track perfectly with industrial structure—indeed, there is some evidence that traditionally low-skill industries are reorganizing to include high skill jobs (Gibbs et al 2004). Nevertheless, information-intensive industries tend to have more high-skill, high-wage jobs; more than anything else, the information industry is built on skilled people (Drennan 2002; Nelson 2005).

This raises a third potential problem: skill is often measured by educational attainment, but educational attainment is an imperfect proxy for ability. Productivity varies tremendously across people who have earned a college degree, and unmeasured differences between similarly-educated people might have a strong impact on productivity and thus wages.

Lastly, discussions about immigration's impact on wages become hard to separate from discussions about industrial structure and education's impact on wages. Immigration is not monolithic—California's foreign-born population includes both urbane highly trained software engineers and the illiterate rural poor—and the location of skilled and unskilled immigrants will be determined in part by the job opportunities available in different places. The economic impact of unskilled immigrants is, after all, driven more by their being unskilled than by their status as foreign-born.[4]

Bearing all these qualifiers in mind, we can nevertheless speculate as to how industrial change may have contributed to wage divergence in California. Education is the principal input of knowledge industries, and one of the starkest differences between California's coast and its interior

[4] Skilled undocumented immigrants might be an exception to this assertion. The undocumented are greatly constrained in the sorts of jobs they can take, so even the highly educated undocumented could end up in low-skill low-wage jobs. But in practice most undocumented immigrants are also unskilled.

can be found in levels of educational attainment. California has, on the whole, a larger share of college-educated residents than the nation. Yet the great majority of these residents have, for the last 40 years, lived on the state's coast (probably not coincidentally; until 2003 all of California's major research universities were also in coastal metropolitan areas).[5] And since 1970, the gap in the level of educational attainment between the coast and the interior has widened, even as education has grown more important as a determinant of earnings. In the years between 1969 and 1979, across all 26 of California's metropolitan statistical areas, the simple correlation between the metropolitan average wage and the share of adults with a Bachelor's degree or more was 0.27. For the time period of 1989 to 2000, however, that correlation increased to 0.75. Yet during that same time levels of educational attainment in the coast and the interior continued to diverge. The same pattern holds if we look at the share of metropolitan earnings derived from information industries.

Given these facts, we can forward three hypotheses. First, we should expect that changes in metropolitan industrial structure will closely track changes in metropolitan educational attainment. Second, to the extent we can separate the effects of education and industrial upgrading, both should positively influence the level of the average wage. And third, we can expect that population size will interact with both industrial structure and educational attainment, and have a positive impact on the average wage. That is, there may be a wage benefit associated with a large MSA, and a wage benefit associated with an educated populace, but there may also be an additional independent effect that is generated by having educated people *in* a large place. Larger places, in other words, might "get more" out of their educated people, productivity-wise. We can think of three reasons why this may be the case.

The first explanation is unobserved differences across the college-educated. Large places, because they offer more labor market opportunities and more consumption opportunities, might simply attract the most productive college educated workers (Shapiro 2006). If the best people migrate toward the most desirable places, productivity and wages will be higher in those places.

The second explanation is specialization. As we noted earlier, it is difficult to tell using available data if earnings from information earnings are actually part of a region's export base. However, it is reasonable to believe that a greater share of knowledge-sector earnings in larger places represents specialized, export-based activity. Thus the interaction of educational attainment and/or information earnings with population size might represent a greater degree of export activity.

[5] In 2003, the University of California opened a campus in Merced.

The final possible explanation, which is closely related to specialization, is that the interaction of size and industrial structure (or size and educational attainment) could proxy for the benefits of agglomeration; the better transmission of ideas and knowledge.

Naturally, all three explanations may also be valid—they are not mutually exclusive. All posit that skilled people are more productive in larger places, and that this increased productivity enhances the average wage.

The Changing Industrial Structure of Metropolitan California

We measure industrial specialization by focusing only on those industries that we believe produce traded goods and services. Those are industries whose output *could* bring in revenue from other places or that *could* be in competition with non-local firms for local markets. As we mentioned earlier, whether these industries are export-based or not is impossible to determine with the data we use. We view local industries, producing non-traded goods and services, as endogenous to urban growth and therefore not a source of differences in growth across urban places.

Using an industry taxonomy developed by Drennan (2002), we partition the traded goods and services industries into two parts. The industries in each of our groups are two-digit North American Industrial Classification System industries. The taxonomy used here was originally applied to the Standard Industrial Classification (SIC) of industries. In this paper we use SIC codes when dealing with older data, but also apply the taxonomy to the new North American Industrial Classification System (NAICS).

The first category we create is goods production and distribution, or GP&D (agriculture, mining, manufacturing, wholesale trade, and transportation). GP&D is, essentially, the group of traditional economic activities that drove almost all urban external trade through the first half of the twentieth century.

GP&D has become less important with the rise of what we label the knowledge industries (information, finance and insurance, professional and technical services, educational services, health, and finally arts and entertainment). These industries are the more recent component of traded goods and services, and are notable for being a steadily growing share of the U.S. economy, while the goods production and distribution sector is for the most part a contracting share (although many of the GP&D industries continue to grow absolutely).

The dominant industries in the knowledge sector are the producer services—high-wage industries such as finance, insurance, computer software, business consulting, law, engineering, architecture and other professional services—that essentially sell knowledge to firms, governments, and non-profit organizations. Previous research on urban industrial structure has shown that the largest metropolitan areas tend to be specialized in knowledge industries, particularly producer services, while smaller metropolitan areas tend to be specialized in goods production and distribution industries (Black and Henderson 1999; Drennan 2002; Drennan and Lobo 2008). Data from the Bureau of Economic Analysis shows that in 2003, almost 80 percent of metropolitan producer services earnings were generated in metropolitan areas of 1 million or more, even though these areas contained only 54 percent of the country's metropolitan population.

Table 2: Mean Shares of Earnings from Goods Production & Distribution and Producer Services, 1969-2000

12 Interior Places	40.3	30.0	-25.6	6.8	10.8	58.8
4 Large Coastal Places	37.5	29.0	-22.7	11.6	32.5	180.2
All Interior	36.5	28.2	-22.7	6.7	12.0	79.1
All Coast	29.5	29.6	0.1	9.8	24.4	148.1

Source: U.S. BEA

Table 2 shows the change in the share of earnings from both goods production and producer services between 1969-2000 for both the 12 interior MSAs in our study and the four large MSAs on California's coast. The table suggests that the 12 small interior MSAs have had difficulty transitioning into the knowledge economy. The share of metropolitan earnings from goods production and distribution fell considerably in both the 12 interior places and the four large coastal places, but the interior's losses in GP&D have not been accompanied by large gains in earnings in information. In 1969, the simple mean for the share of metropolitan earnings from goods production and distribution industries in the 12 interior MSAs was 40 percent. In the four coastal MSAs it was 38 percent. Over the next 30 years that share fell to 30 percent in the small interior places, and to 29 percent in the large coastal MSAs.

Over the same time period, however, the four large MSAs saw a 180 percent increase in the mean share of earnings from producer services industries, while the inland MSAs saw only a 59 percent increase. Nor did the two sets of places have equal starting points. Where in 1969 the mean shares of GP&D earnings for the big coastal MSAs and the 12 interior MSAs had been roughly the same, in 1969 the mean share of producer services earnings on the coast was already almost double what it was in the interior. By 2000 the mean share on the coast was triple the share in the interior. In both El Centro and San Francisco, for example, the GP&D share of earnings fell by 40 percent. But in San Francisco producer services' share of earnings rose by almost 200 percent, while in El Centro the share rose by 4 percent. In Visalia-Porterville and Hanford-Corcoran, the share of earnings from producer services actually fell, by 9 and 29 percent respectively, to go along with declines of 17 and 16 percent in the share of earnings from GP&D.

The Industrial Structure of Metropolitan California Today

Table 3 shows that in 2003 the export bases of the interior metropolitan areas were not just smaller but also qualitatively different from the export bases of the coastal metropolitan areas. For comparison purposes Table 3 also shows figures on traded goods and services for all U.S. metropolitan statistical areas in 2003 (this is NAICS data). In general, traded goods and services account for roughly one-half of metropolitan earnings (Henderson 1988), and this generalization holds for all U.S. metropolitan areas (55 percent of earnings) and for the four coastal California metropolitan areas (56 percent). For the 12 interior metropolitan areas, however, the share is markedly lower: 46 percent.

Table 3: Earnings by Traded Goods and Services Industries, 2003
All US MSAs, Four Large California Coastal MSAs, and 12 Small California Interior MSAs

Earnings (Millions of $)	7,133,751	755,576	70,721
Share of Earnings from Traded Goods & Services			
Goods Production & Distribution Sector			
Farming	0.6	0.3	5.1
Forestry, Fishing & Related	0.4	0.1	3.7
Mining	0.8	0.2	1.2
Manufacturing	13.4	13.2	8.9
Whoesale Trade	5.1	5.1	3.7
Transportation and Warehousing	3.3	2.7	3.9
Knowledge Sector			
Information	3.9	6.2	1.4
Finance and Insurance	7.5	7.5	3.4
Professional & Technical Services	9.1	12.0	4.0
Educational Services	1.3	1.2	0.5
Health Care & Social Assistance	9.4	7.5	10.7
Arts, Entertainment & Recreation	1.1	1.8	0.5
All GP&D	23.6	21.5	26.5
All Knowledge	31.1	34.4	20.0
Sum of Traded Goods and Services	54.7	55.9	46.4

Source: U.S. BEA

The coastal MSAs are also far more specialized in the knowledge sector, while the interior areas are more specialized in goods production and distribution. The knowledge sector accounts for over 34 percent of earnings in the four large metropolitan areas, while the goods production and distribution sector accounts for 22 percent. The opposite is true for the 12 inland areas, which derive only 20 percent of earnings from the knowledge sector and 27 percent from goods production and distribution.

For all U.S. MSAs, goods production and distribution accounts for 24 percent of earnings, while the knowledge sector accounts for about 30 percent. Thus the two sets of California places sit at opposite ends of the national distribution: the coastal places have an above average concentration of knowledge sector earnings while the inland areas have a below average share.

The GP&D share among the inland metropolitan areas is not just larger but also differently composed than the shares in both coastal California and U.S. metropolitan areas as a whole. The largest part of the goods production and distribution sector in all U.S. MSAs and in the four coastal MSAs is manufacturing, which accounts for 13 percent of earnings in both sets of places. Manufacturing is also the portion of GP&D that pays the highest wages. In the 12 small inland MSAs, however, manufacturing accounts for only nine percent of earnings. The high share of GP&D in the interior comes not from manufacturing but from an unusually large share in agriculture (including forestry and fishing) and mining. These economic activities constitute 10 percent of earnings in the inland metros, compared with less than two percent for all U.S. MSAs and less than one percent for the coastal MSAs. These activities are also characterized by concentrations of low-skilled workers and low pay.

The only portion of the knowledge sector where the 12 interior metros have earnings shares that surpass the coast and nation is the health care and social assistance industry. This is, unfortunately, one of the low wage industries of the knowledge sector. Thus the 12 inland metropolitan areas get the worst of both worlds. Their economies are in general heavily biased toward GP&D, but not in the one area of GP&D—manufacturing—that pays moderate to high wages. Likewise they are under-represented in the knowledge sector but over-represented in one area of that sector that pays poorly.

Education and Immigration

Compared to the coastal metropolitan areas and to California as a whole, individuals in the 12 interior MSAs are poorer, less educated, and more likely to be Hispanic. They are *not*, however, more likely to be immigrants. Between 1969 and 2000 the share Hispanic grew sharply on the coast and in the interior. While the growth in the share Hispanic was slightly less in the interior than on the coast, the interior started with a greater share Hispanic, and therefore ended with a greater share as well (Table 4).

Table 4: Ethnicity, Immigration and Educational Attainment, 1969-2000

12 Small Interior MSAs	19.7	36.4	84.9	6.2	18.2	194.2	9.3	13.9	49.9
4 Large Coastal MSAs	14.7	27.8	89.1	9.1	29.3	223.2	15.8	33.8	114.1
All Interior MSAs	13.9	28.1	102	7.7	25.4	282.2	14.5	29.9	106.9
All Coastal MSAs	18.2	33.9	86.1	6.0	18.1	198.9	9.7	15.4	58.2

Source: U.S. Census Bureau

The story is reversed in terms of both immigration and education. The coastal MSAs, and in particular the four large coastal places, had a greater share foreign born in 1969 than did the interior places, and larger subsequent growth in immigration as well. The mean share foreign-born grew 200 percent across the interior MSAs, and 280 percent across the coastal MSAs. Similarly, the four coastal MSAs had the highest initial endowments of educated people, and also the largest subsequent gains. The mean share of people with a BA or higher more than doubled in the large coastal MSAs, and doubled on the coast overall, but grew by only 50 percent in the 12 small interior MSAs, and only 60 percent in the interior overall. All four large coastal MSAs saw increases of over 100 percent in the share of adults with a BA or more, while none of the interior MSAs saw an increase that large, and only one saw an increase that exceeded 90 percent. In two of the small interior MSAs, Hanford-Corcoran and Madera, the share of adults with a BA or more actually declined. Over the whole 30-year period the interior's gains in educational attainment were quite small; in 2000 only three of the 12 small interior MSAs had levels of educational attainment that surpassed San Francisco's levels in 1969. In only one small interior MSA—Chico—did more than 20 percent of the population have at least a BA.

The relationship between education and immigration is noticeably different on the coast than it is in the interior. In the four large coastal MSAs over the 1969-2000 period, the simple correlation between the share foreign-born and the share college-educated is a strong 0.7, and the correlation between the share foreign-born and the metropolitan average

wage is 0.6. In the 12 small interior MSAs over the same time period, however, immigration has essentially no correlation with educational attainment (0.01) and a noticeably *negative* correlation with the average wage (-0.4). In 2000, in eight of the 12 interior MSAs, over 60 percent of the foreign-born population was from Mexico (in El Centro the share was over 90 percent). Immigration in the large coastal MSAs, by contrast, was less monolithic—Mexican immigrants accounted for less than half the foreign-born in the big coastal places (Table 5). These stylized facts are consistent with previous research suggesting that immigrants to the interior are for the most part poorly-educated rural Mexicans who work poverty-wage agricultural jobs (Taylor and Martin 1997, Taylor et al. 2006). Again, however, the influence of immigration on the wage is more likely to be a result of the immigrants' skill levels and the opportunities available to them, not a result of their place of origin per se.

Table 5: Characteristics of Individuals in 12 Interior and Four Coastal MSAs, 2000

	Percent Hispanic	Percent Foreign-Born	Percent Foreign-Born from Mexico
Bakersfield	38.4	16.9	74.4
Chico	10.5	7.7	44.0
El Centro	72.2	32.2	94.1
Fresno	44.0	21.1	66.4
Hanford-Corcoran	44.0	16.0	79.5
Madera	44.3	20.1	86.4
Merced	45.3	24.8	69.9
Modesto	31.7	18.3	62.2
Redding	5.5	4.0	23.9
Stockton	30.5	19.5	51.5
Visalia-Porterville	50.8	22.6	82.4
Yuba City	20.0	13.2	51.6
Los Angeles	41.4	34.7	44.5
San Diego	26.7	21.5	48.2
San Francisco	17.8	27.4	38.9
San Jose	24.0	34.0	24.4
California	32.4	26.2	44.3
United States	12.5	11.1	29.5

Source: U.S. Census, 2000

Sources of the Growing Wage Gap

In this section we carry out simple empirical tests for impacts of our four factors upon metropolitan wages in California. If our hypothesis is correct, then over the period of 1969-2000 the level of the metropolitan average wage in California should be positively related to large population, the level of educational attainment, and the share of earnings from producer services. Earnings in goods production and distribution, we hypothesize, have declined in importance, and probably have a much smaller influence on the average wage. Once educational attainment is controlled for, the level of the average wage should not be influenced by the MSA's share foreign born. (Although we should emphasize again that immigration's impact on the lower rungs of the labor market might be quite different from its influence on the wages of an entire region.) Lastly we add temporal and spatial qualifications: we hypothesize that the returns to information earnings and education will have increased over time, as metropolitan economies in California, like those in the United States as a whole, have shifted toward knowledge industries. And we hypothesize that in large places and possibly coastal places as well, the returns to information earnings and education will be greater than they will be in smaller MSAs or interior MSAs.

Our sample is a panel of all 26 California MSAs, observed in 1969, 1979, 1989 and 2000 (N=104). This is a small sample, so the results of these tests may be prone to problems of small numbers. As such, our estimates should be considered suggestive rather than definitive. We use wage data from the U.S. Bureau of Economic Analysis (BEA), and express it in 2004 dollars. Data on population and industrial earnings also comes from the BEA. We represent population as a dummy variable with one for MSAs with a population over one million. Our two variables for industrial composition are the MSA's share of earnings from producer services and from goods production and distribution. Data on educational attainment (the percent of adults over 25 with a BA or higher) comes from the U.S. Census, as does data on the MSA's percent foreign born.

We also add a dummy variable for coastal location for two reasons. First, coastal areas, large or small, can benefit from an amenity premium. While natural resources have declined as valuable sources of *production* in the United States, they have increased as sources of consumption (Glaeser et al 2001; Glaeser and Kohlhase 2004). A coastal area with temperate climate will probably have high land values that are, again, partially reflected in the metropolitan wage. Second, over the time period we are studying economic activity has increasingly spilled over MSA borders, and MSAs that were once more or less autonomous markets have bled into one another. California has 26 MSAs. Six of those MSAs are larger

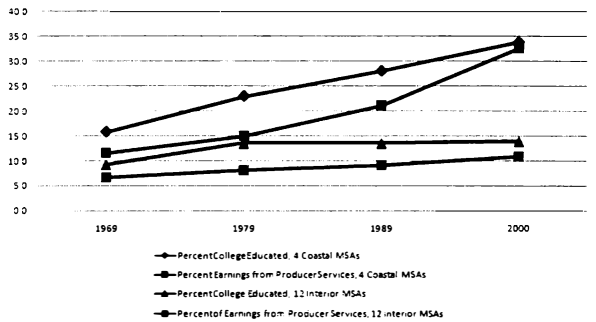
than one million in size, and 11 are on the coast. Two of the six very large MSAs (Sacramento and Riverside San Bernadino) are in the interior, while nine of the coastal MSAs have fewer than one million people. Wage growth between 1969 and 2000 in the large interior places was slower than in the coastal places: wage growth was nonexistent in Riverside-San Bernadino and sluggish in Sacramento (five percent). Of the coastal places with populations below one million, some—such as Salinas, Santa Cruz, Oxnard and Santa Rosa—saw impressive wage growth between 1969 and 2000, ranging from 14 percent to 32 percent. In other small coastal places, however, like Santa Barbara and San Luis Obispo, wages grew slowly or barely budged.

One possible explanation for these wage differences is that most of the small, high-wage coastal areas are parts of larger consolidated metropolitan areas—Salinas, Santa Cruz and Santa Rosa are all satellites of San Jose and San Francisco, while Oxnard is an extension of Los Angeles. Santa Barbara and San Luis Obispo, by contrast, are smaller, less dense, and not parts of larger CSAs. The higher wage places might therefore benefit from being part of the bigger coastal agglomerations, which would partly explain their superior wage growth.

The coastal dummy variable allows us to capture some of these unobserved amenity effects, as well as some spillover effects from the merging of individual MSAs into larger labor markets. (The dummy variable does not, however, allow us to draw distinctions between these effects).

We can begin the analysis by showing that educational attainment and producer services earnings do in fact move together, as we hypothesized at the outset of this article. Figure 2 shows the time-trends for the average educational attainment and the share of earnings in producer services for the four large coastal MSAs (bottom two lines) and the 12 small interior MSAs (top two lines). For both sets of places, education levels and knowledge sector specialization track closely with one another. But where the trend is a fairly steady, and substantial, increase for the four large coastal MSAs, in the interior places the trend line is flatter.

Figure 2. Percent of Earnings from Producer Services and Percent College Educated, Costal and Interior MSAs



Source: U.S. BEA

The close relationship between educational attainment and producer services is also reflected in a very high coefficient of correlation between the two variables (0.84). Educational attainment is in turn correlated with wages at 0.64, while wages and producer services are correlated at 0.68. Correlations of this magnitude have both a theoretical and a methodological implication. The theoretical implication is that with respect to wages, educational attainment and producer services earnings are jointly determined, and in some ways probably measuring different aspects of the same underlying phenomenon—the move toward an information-oriented economy. Methodologically, the coefficient of above 0.8 suggests that any regression including both variables would suffer from multicollinearity. Further diagnostics confirm this problem.[6] As a result we drop the producer services variable, and present only regressions that include the educational attainment variable. This may bias the coefficients somewhat, but we believe the risk of bias is outweighed by the potential problems caused by multicollinearity, particularly given our relatively small sample. To be thorough, we also

[6] There is no single test for multicollinearity, but correlations of above 0.8 are a generally accepted rule of thumb for detecting its presence between two variables. Using bivariate correlations can often understate the problem, however, because multicollinearity can exist between three or more variables. In our case the collinearity between education and producer services is exacerbated by collinearity with the population dummy variable. The three variables together have a mean variance inflation factor of 2.63—a VIF of one is considered the threshold for troublesome multicollinearity. The three variables also have a condition index of just fewer than 25. A condition index of 30 is normally considered the acceptable threshold, but because multicollinearity increases variances by denying data to the regression estimator, our relatively small sample size probably exacerbates the problem further.

estimated all the regressions using the producer services variable rather than the educational attainment variable, but in the interest of conserving space we do not report those results below. The results were substantively similar for both variables, reinforcing the idea that both are measuring the same underlying factors.

Table 6 shows two estimated panel regressions. In all our regressions both sides of the equation, except dummy variables, are log-transformed, and standard errors are clustered at the MSA level to control for both heteroskedasticity and autocorrelation. In both of Table 6's models, he coefficients on the population dummy, the coastal dummy, and the educational attainment variables are positive and significant; the share of goods production earnings and foreign-born are not significant and their coefficients are small. The logged form of the equation allows us to interpret the coefficients as elasticities, so Model 1 implies that over the period from 1969-2000, a ten percent increase in the share of the population with a BA or higher was associated with a 1 percent increase in the metropolitan average wage, holding all else constant.

Table 6: Determinants of the Average Wage, 26 California Metropolitan Areas

	Model 1: 1969-2000			Model 2: 1989-2000		
	Coefficient	Robust Std. Error	P>z	Coefficient	Robust Std. Error	P>z
Population over 1 Million	0.163	0.048	0.001	0.141	0.041	0.001
Coast	0.079	0.035	0.027	-0.122	0.091	0.179
Percent College Educated	0.094	0.052	0.071	0.506	0.154	0.001
Goods Production Share	0.024	0.074	0.749	0.117	0.107	0.272
Percent Foreign Born	0.004	0.012	0.725	0.082	0.060	0.169
Constant	9.954	0.353	0.000	8.301	0.733	0.000
R2						
Within			0.05			0.49
Between			0.64			0.77
Overall			0.51			0.73
N			104			52

Source: U.S. BEA and U.S. Census Bureau

Model 2 differs from Model 1 by excluding the observations from 1969 and 1979, testing the idea that in the last two decades educational attainment has become more important in determining the metropolitan wage. Our earlier caution about small sample size is even more important in this case; we are drawing broad contours with this equation, not specific conclusions. Nevertheless, our results lend credence to the idea that the association between education levels and wages increased after 1980. The coefficient on educational attainment grows substantially, and suggests that in the 1980s and 1990s a 10 percent increase in the percent of the population with a BA or more was associated with a five percent increase in the metropolitan average wage, holding all other factors constant. Note also that the coefficient on population size, while still significant, shrinks somewhat, while the dummy for coastal location is no longer significant. This suggests that in the 1980s and 1990s changes in educational attainment (or whatever underlying process that variable is measuring) had more influence over the variance in wages than did sheer population size or location.

Taken together, Models 1 and 2 suggest that the influence of educational attainment on the metropolitan average wage between 1969 and 2000 has been modest but growing; that is, the relatively small 40-year effect masks a steadily increasing importance in the last twenty years of the panel. This finding is consistent with Drennan's (2002) study of all U.S. MSAs, and suggests that the difference in wages between California's small interior places and its large coastal MSAs can be explained not just by differences in their stocks of educated people, but also because those differences have grown even as educational attainment has become more important.

We next test the idea that the wage returns to educational attainment will be bigger in larger MSAs. Across our entire panel, the coefficient of correlation between wages and the percent of the population with a Bachelor's degree or higher is 0.63. For places with a population of one million or more, the correlation is 0.75, while in interior metropolitan areas the correlation is only 0.28. In Table 7 we present Models 3 and 4, which are identical to Models 1 and 2 except that each equation has interaction terms; Model 3 has an interaction that combines population size of one million or more with educational attainment, and one that combines coastal location with educational attainment. Model 4 has the only population and education interaction.

In both models the interaction terms are large and significant. This suggests that educational attainment levels do combine with population size and coastal location to have an independent effect on wages. Model 3 suggests, in fact, that the results of Model 1 were deceptive. The modest

effect of educational attainment levels on wages reported in Model 1 were actually an average of high returns to education in very large places, and small-to-negligible returns in other places. From 1969-2000, in coastal places a 10 percent increase in the share of the population with a BA or more was associated with a 1.5 percent increase in the metropolitan wage, all else equal. In places with a population of one million or more, a ten percent increase in the share of the population with a BA or higher was associated with a 1.4 percent increase in the metropolitan wage, all else equal. And in MSAs that were both on the coast and had populations of over one million, a 10 percent increase in the share of the population with a BA or higher was associated with a three percent increase in the metropolitan wage.[7]

Table 7: Determinants of the Average Wage, 26 California Metropolitan Areas

	Model 1: 1969-2000			Model 2: 1989-2000		
	Coefficient	Robust Std. Error	P>z	Coefficient	Robust Std. Error	P>z
Population over 1 Million	-0.497	0.331	0.133	-1.518	0.778	0.051
Coast	-0.562	0.131	0.000	*	*	*
Percent College Educated	-0.078	0.038	0.039	0.270	0.047	0.000
Goods Production Share	0.001	0.054	0.980	0.048	0.070	0.492
Percent Foreign Born	-0.004	0.011	0.691	0.055	0.045	0.224
Population*Education	0.224	0.114	0.050	0.527	0.238	0.027
Coast*Education	0.231	0.045	0.000	*	*	*
Constant	10.496	0.196	0.000	9.240	0.301	0.000
R2						
Within			0.32			0.63
Between			0.66			0.81
Overall			0.58			0.78
N			104			52

[7] The coefficient for the education variables is a linear combination of the education coefficient and its interaction terms. The coefficients on the dummy variables should not be interpreted, as they lie outside the range of the data set. For example, in the presence of the interaction term the population dummy represents the wage effect associated with a population of one million or more where no one has a college degree. The strongly negative coefficient therefore makes mathematical and intuitive sense, but it is substantively meaningless.

The non-interacted educational attainment coefficient, which represents the effect of educational attainment in the small interior places, is now negative and significant. This curious result should be interpreted as an association rather than a causal link. An increase in levels of educational attainment did not result in declining wages in California's interior. But the two did take place contemporaneously: wages fell, and education levels rose. The most likely explanations for this are commuting and retirement. A number of the interior MSAs, such as Stockton and Chico, have in recent years become bedroom communities for larger coastal MSAs, and it is reasonable to think that educated residents of these smaller MSAs commute to San Francisco, San Jose, and other coastal labor markets. The returns to these individuals' efforts show up in the wages of the MSA where they work, rather than of the one where they live. Similarly, some of the small interior MSAs have retirement communities, which are populated by highly educated people who do not work. In a declining MSA with a small population, this fact, combined with cross-MSA commuting, can create a statistical impression that rising education leads to lower wages. However it is more accurate to conclude that over the 1969-2000 period, educational attainment simply was not associated with wage gains in the small interior MSAs.

Model 4, like Model 2, includes only those observations from 1989 and 2000. In order to preserve degrees of freedom, we drop the coastal dummy and the coastal interaction. Here we see, again, that education has become more important in the second half of our panel. We see also, however, that the interaction effect has grown as well. Model 4 suggests that in the 1980s and 1990s, in places with a population of over one million a ten percent increase in the share of the population with a BA or more was associated with an almost eight percent increase in the metropolitan average wage. Unlike Model 3, however, in Model 4 the stand-alone educational attainment variable is large and significant. In places of less than one million people a ten percent increase in the share of the population with a Bachelor's degree or higher is associated with an almost three percent increase in the metropolitan average wage—a notable magnitude, but less than half the effect in the very large MSAs. Educational attainment therefore became more important to wage levels statewide from 1969-2000, but the wage returns to education became larger in larger places.

Conclusion

Figure 1 showed that wage divergence in California began in earnest sometime in the 1980s, and accelerated in the 1990s. Our analysis offers some explanation for this fact. Over the period from 1969 to 2000,

traditional urban economic activity—goods production and distribution—contracted relatively in California, and knowledge economy activities began to rise. But where the GP&D share of metropolitan earnings fell in both the interior of the state and its coast, knowledge economy earnings increased meaningfully on the coast alone. As the knowledge economy (and its primary input, formal education) became more important in the 1980s and 1990s, its influence on wages grew. But this influence grew more, and faster, on the coast than it did in the interior. The coastal areas had not only more skilled people and industries, but also higher wage returns to these inputs than did the interior MSAs. The reasons for this wage premium are unclear: the increased wage effect might represent agglomeration economies, specialization, or heterogeneous ability within the ranks of educated people. It may be that large places make educated people more productive, but it may also be that the more productive educated people are drawn to larger places because of the opportunities they offer. Or it may be some combination of both.

The returns to skill help explain why coastal wages grew much faster than interior wages, but they do not necessarily explain why wages in a majority of the interior MSAs declined absolutely. Nor does our study shed light on the variation of wages within a given metropolitan area: certainly MSAs like Los Angeles and San Francisco have their share of economic distress, which a high regional average wage can mask. Future research should use individual-level wage data (such as that found in IPUMS) to more closely assess the economic well being of individuals within these regions, and also to enable statistical estimates that have more reliable levels of power.

From a policy perspective, the small interior MSAs of California present a dilemma. Declining regions usually undergo natural, albeit painful, corrections when their residents leave (Pritchett 2004). In inland California, however, falling real wages have been accompanied by surging population *growth*. Whether this growth is harmful is a difficult question. A large portion of the population growth in the interior seems to be the result of unskilled immigration, and it is possible that the presence of unskilled immigrants prolongs the interior's dependence on primary production activities like agriculture, which pay low wages. But there is little reason to think that a decreased dependence on primary production will usher in a new industrial regime. Goods production's share of earnings is larger in the interior than it is on the coast, but it is still falling steadily. Nor is there any reason to believe that fewer unskilled residents will prompt an in-migration of educated citizens. Indeed, one of the interior's problems may be that the two forms of traded goods and services share so few inputs. In 1969 the large coastal MSAs had sizeable GP&D industries, but they also had large (for that

time) stocks of educated people and nascent knowledge agglomerations. When manufacturing and other goods production industries contracted, these MSAs were able to move more easily into producer services and other information sectors. But the *individuals* in GP&D occupations were not necessarily able to move into information industries.

One approach for policymakers in the interior is to attract information industries. But attracting information industries will be of limited benefit to the unskilled workers who currently live in the interior, even assuming that programs to create or attract knowledge industries work—a large assumption, given that industrial incentive programs are often quixotic (Fisher and Peters 1998; 2004). Frustrating though it may be to admit, after decades of study academics still have few good answers about why certain industries locate in certain places. To a certain extent industrial location reflects little more than historical contingency: industries start in one place and tend to stay there (e.g., Hollywood) and exogenous demand shocks can either catapult these industries and the places that host them forward (like computers in Silicon Valley) or send them spiraling into decline (like automobiles in Detroit). When industrial geography is something that everyone can explain after the fact but no one can predict before, there is little for policymakers to do. While we understand the political appeal of programs designed to turn wayward regions into high-tech centers, we are doubtful of their efficacy.

Another approach is to focus on education. Certainly higher education is a long-term answer for the young in California's interior, but anyone endorsing education as a solution for these areas should be aware that individuals in declining places will, once educated, probably leave. Those who are educated will benefit, but the places from which they depart will not. Nevertheless, we should not begrudge those with the option of exit their decision to exercise it. Economic development should be first about helping people, and only second about helping places.

The people-place distinction is perhaps most acute in the case of immigration. Our analysis found that immigration had no meaningful impact on metropolitan average wages in California between 1969 and 2000. Yet it seems reasonable to think that the low levels of educational attainment in California's interior owe, at least in part, to a steady influx of poorly educated immigrants. So it is possible that immigration has had an indirect influence on wages in the interior. But a proper analysis of immigration requires that we consider its impact not just on the places that receive the immigrants, but also on the immigrants themselves. In 1999 the per capita income in Mexico was about $4,500. In rural areas of Mexico it was much lower. Thus almost every immigrant who came to the 12 interior MSAs in California was made better off as a result. But where immigration makes *people* better off, it can make *places* relatively

worse off. The arrival of poor people increases the poverty rate, even if immigrants, once they arrive, are *less* poor than they once were. The anti-poverty benefits of immigration are international, but immigration's costs—both economic and political—are often local. Resolving this tension will be a challenge for California in general, and for its interior in particular.

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