

**HOUSE BUILDING IN THE MACHINE AGE, 1920s-1970s:
REALITIES AND PERCEPTIONS OF MODERNISATION.**

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HOUSE BUILDING IN THE MACHINE AGE, 1920s-1970s: REALITIES AND PERCEPTIONS OF MODERNISATION.

During the 1930s and 1940s, the editors of *Fortune* ran a series of articles on the subject of the building industry, publishing an early collection as a book and a later group as a special issue in 1946.¹ The following year they summarized their point of view in a catchphrase that caught the temper of the time.² House building, they argued, was incidentally corrupt and inherently inefficient. Hidebound by tradition, a legacy of feudal craft in the modern manufacturing era, it was the industry that capitalism had somehow forgotten. Although members of the industry challenged the claim, *Fortune's* phrase was echoed in the popular press, in Congressional reports and, such was its resonance, in Canada and the Antipodes.³ The muck stuck. Four decades later, in a selective review of changes that had occurred in the interim, Tom Schlesinger and Mark Erlich claimed that the building industry had finally entered the corporate era and threw *Fortune's* phrase back in its face.⁴

This narrative, which speaks of stubborn traditions displaced by rapid modernization, downplays continuity and is intellectually unsatisfying. In 1947 the building industry contained innumerable businesses. It was ruthlessly competitive; how could anyone claim that it was untouched by capitalism? It consisted of all sorts of enterprises, of all sizes, operating methods, and degrees of vertical integration. In a competitive environment peopled with entrepreneurial diversity, how could grossly inefficient methods possibly have survived? An obvious answer was

that they had not, and that the industry was well adapted to its business environment. Visitors to the United States were unanimously convinced that this was the case. A few observers of the domestic scene also suggested this possibility, but they were not taken seriously. Obsessed, from the 1920s, by an ideal of mass production that seemed to be embodied in the manufacture of automobiles, contemporaries wrung their hands. They puzzled over why the industry did not fit the model, and lauded the innovations and entrepreneurs that promised to take it in a modern direction. Routinely blinded by preconceptions, and sometimes also by self-interest, their perceptions bore only a weak resemblance to the realities of the building trade.

In subsequent decades, most urban and business historians have failed to probe behind the screen of criticism that contemporaries offered. More than a decade ago Marc Weiss observed that the house building industry has been “generally ignored by U.S. historians,” and little has changed since.⁵ Those business historians who have been guided by Alfred Chandler’s emphasis on leading firms in capital intensive sectors of the economy have not found home builders significant.⁶ Hounshell barely mentions them, and his explanation for their failure to industrialise lacks conviction.⁷ Even those, like Philip Scranton, who have explored “the other side of industrialisation,” have focussed on other industries, including textiles, garments, tobacco, metal fabricating, jewelry and furniture manufacturing.⁸ In contrast, urban historians have written a good deal about housing, but have focussed on conditions, designs, policies and politics.⁹ Beginning with Sam Bass Warner, some have studied residential development, but in their accounts construction usually plays second fiddle to land planning, and the emphasis has been on the untypical, leading players, such as Samuel Gross, the largest builder in Chicago in the late nineteenth century, J.C. Nicholls, an early community builder who was active in Kansas

City in the interwar years, and the big developers of the post-war era, such as Kaiser in Southern California, Eichler in the Bay Area, and the Levitt Brothers on the east coast.¹⁰ The writers of even the best textbooks have followed this cue.¹¹ A mere handful of scholars have studied the builders themselves, including the small businesses who have always dominated the ‘industry,’ together with the amateurs who have played a fluctuating but never trivial role.¹² These scholars have offered vignettes and insights, but their case studies are few in number and have not generally addressed post-war trends. Drawing upon the available historical research, as well as contemporary evidence, we contrast the evolving character of the industry with the perceptions of contemporaries, before concluding with some thoughts as to how the building industry might more usefully be conceived.

Because of our concern to elucidate how the building industry has been conceptualized, we frame our survey by the period in which a particular view was dominant. During the 1920s the achievements of the auto industry caught the popular imagination. The assembly-line production of cars raised productivity and reinforced a virtuous circle of declining costs, growing demand, larger production runs, and further improvements in productivity. By the mid-1920s this method had become an ideal, and was viewed as the benchmark against which house building was to be judged. Through the 1960s, innumerable discussions made this comparison explicit, and in others it was an implied point of reference. This way of thinking has persisted, but from the 1970s has been called into question, first by the expansion of flexible methods in the mass production industries, and then by an academic literature that has tried to tease out the logic of these developments. We confine our survey, then, to the era of high modernization, the machine age. This era found its purest expression in the United States, but it

shaped thinking throughout the developed world. Builders in Britain, western Europe and the Soviet bloc, used a different mix of materials and methods, but were similarly judged on the criteria of scale, the adoption of factory methods, and above all of efficiency. Those in Canada and Australia were not only judged in the same way as those in the United States but used very much the same materials, techniques, and organisational structures. Our survey, then, uses the latter two countries as a counterpoint to the United States, while raising issues that, we believe, have broad relevance to our understanding of house building in the middle decades of the twentieth century.

The House Building Industry, 1920s-1970s

In 1953 Sherman Maisel, author of the finest study of the North American industry to be published in the twentieth century, commented that “less is known about housebuilding than

¹³ In one sense he was right. The product and the industry have always been complex, and few have understood the elusive logic of the shifting connections among builders, suppliers, contractors, subcontractors, and the trades. In another sense, however, he was wrong. Most people have had some sense of what goes into the making of a house, the lumber, bricks, wiring, and so forth, as well as of the basic methods of manufacture and assembly, including the techniques of framing, bricklaying, roofing, plumbing, and painting. These are much more familiar technologies than those involved in many manufacturing processes. Then, too, we all appreciate that the finished product is a rather unusual commodity:

large, complex, usually immobile, durable, and sometimes horribly expensive.¹⁴ Finally, certain general facts about the organization of house building have always been fairly clear. The industry is diverse, amorphous, competitive, and subject to great temporal and geographical variability. Whether these features deserve condemnation or praise, however, is another matter, and we need to examine them more closely before considering the judgements that have been expressed by contemporaries and historians.

Some might question whether it is possible to generalize about the building industry over the whole period from the 1920s to the early 1970s. A number of contemporaries emphasized how much it changed, especially during and after World War II, arguing that merchant builders introduced new management techniques. From the perspective of 1963, John Herzog claimed that this shift in scale and approach had been both "drastic" and "relentless."¹⁵ Then, during the 1960s and especially in the United States, a mobile home industry took off, while some outside corporations began to enter the housing field. Looking back in 1973, noting that observers have often compared house builders unfavorably with auto manufacturers, Leo Grebler suggested that finally "one or more 'General Motors' appeared indeed to loom on the horizon."¹⁶ It was this line of thinking that led Schlesinger and Erlich to declare that capitalism had finally taken notice of the industry. But the matter was not so simple.

In the interstices of their presentation, unresolved with their main argument, Schlesinger and Erlich conceded a "foundation of constancy," that industry change had always been "evolutionary rather than revolutionary."¹⁷ They might have poached this term from a number of writers, including James Gillies and Frank Mittelbach, who in 1963 suggested that if merchant builders were revolutionary in their management they were evolutionary in their methods of on-

site production.¹⁸ Similar views were often expressed. In 1944 the Twentieth Century Fund published a survey of the industry undertaken by Miles Colean, whose years with the Federal Housing Administration had made him the leading authority on the subject. Although some observers heralded the innovations that defense contractors were introducing into wartime projects, Colean warned that "effective developments have evolved cautiously and quietly."¹⁹ A quarter of a century of change did not alter the story. In 1967 Donald Schon reflected on the modern history of innovation in the building industry. He was well-qualified to pass judgement, having worked for Arthur D. Little before becoming Director of the Institute for Applied Technology in the US National Bureau of Standards. In this capacity he supervised the Civilian Industrial Technology Program, whose purpose was to foster innovation in "lagging" industries, including construction.²⁰ He suggested that the industry had undergone a cumulatively "radical change of character" but that this had occurred in "small increments".²¹ As he saw it, change had been "so diffuse and made up of so many small parts that it can hardly be called an innovation in the usual sense at all."²²

In truth, many trends and innovations of the postwar years were rediscoveries. In Chicago in the 1880s, and then again in the 1920s, builders like Chicago's Samuel Gross, and Mills and Sons in Hamilton, Ontario, were operating very much in the manner of the postwar merchant builders.²³ The same was probably true in every large city. Challenging Ned Eichler's claims of originality for the merchant builders, Michael Doucet and John Weaver have observed that "improved efficiency came in ceaseless small steps."²⁴ If ever there were a situation where one must speak of continuity in change this was it.

Continuities

Throughout the period in question, the house building industry was complex, including diverse builders and subcontractors, and also ill-defined, shading into other types of construction, into the production and distribution of building materials, and into the informal activities of the Do-It-Yourself enthusiast and amateur builder. At any time, the great majority of builders erected one or two homes a year. Most homes -- and almost all until the 1960s -- were erected on site, and so builders organized work around site operations. Although some switched back and forth, most oriented themselves towards their market in one of three ways.²⁵

Traditionally the most common approach was to work for a particular client, typically a prospective home owner. Acting as a general contractor, the builder then coordinated and supervised a variable number of subcontractors, depending upon which trades he already employed. (The overwhelming majority were men.) A common alternative was for the builder to operate 'on spec', meaning that he built before knowing the identity of the buyer. This was an unremarked norm in most consumer industries, and 'speculative' denoted that this could be an especially risky proposition in home building. Speculative builders usually operated on a larger scale than general contractors, and most observers regarded them as the progressive force in the industry. The FHA worked to promote their growth, and one of the agency's first actions in 1934 was to give them a new and more positive name, 'operative' builder.²⁶ The larger of these were commonly involved in land development, and grew into the 'merchant' or 'community' builders of post-war fame. Many smaller builders, however, bought lots and blocks piecemeal and retained a focus on construction.

The third type of builder was the amateur who built for his own use (oral histories show that the great majority of owner-builders too were male, while women mostly 'helped out'). Amateurs were not part of the building industry, but cannot for that reason be ignored. They were sometimes responsible for building a large minority of homes, and so sweat equity exerted a competitive influence on house prices. A large survey carried out by the Bureau of Labor Statistics showed that across the United States in 1949 amateurs accounted for more than two thirds of all builders, and almost a third of all starts of single family homes.²⁷ Annual data for Australia show a similar level, with a peak in the early 1950s followed by a decline in the amateur's share to 10-15 percent in the late 1950s.²⁸ Even when less common, they still mattered. Like custom and speculative builders amateurs often employed subcontractors, although sometimes only for the most skilful or critical tasks, such as electrical work. Lacking professional knowledge and skills, more than other types of builder they made considerable demands on building suppliers. They were a likely market for kit homes, whether supplied by mail order or by local dealers. Especially in smaller urban centers, and everywhere for about a decade after 1945, they had a major impact on the industry.

Builders of all types relied on suppliers and subcontractors, though in different ways. Vital for amateurs, building supply dealers were scarcely any less important for the smaller professional builders. The manufacture and distribution of building supplies was exceedingly complex. Many materials, such as bricks and concrete, were distributed by manufacturers on a local or perhaps regional basis. Others, notably lumber, were commonly shipped further, sometimes directly, sometimes through wholesalers, and usually through an extensive network of retail lumber dealers. Still others, including tools and hardware, were routinely available from

retailers, including hardware stores, lumber dealers, and department stores. Retailers in effect stockpiled supplies and managed deliveries to the building site, as well as providing advice and credit. Among them, in North America the lumber dealer and in Australia the timber merchant played a critical role.²⁹

Lumber was the most significant material that was routinely distributed through the retail network. In the early decades of the twentieth century, especially in North America, competition from mail order kit manufacturers, such as Aladdin and Sears, encouraged lumber dealers to stock a wider range of goods, to the extent of becoming one-stop building suppliers.³⁰ Significantly, after World War I a new trade journal, *Building Supply News* was established specifically for this category of retail business. In Australia, because timber merchants retained closer financial ties to the forest companies and mills, product diversification did not occur on a large scale until the 1950s.³¹ But there, as in Canada and the United States, dealers were indispensable to the daily operations of the small builder. Indeed, as and when business conditions seemed favorable, many went into the homebuilding business themselves. In 1969, for example, a survey undertaken by the dealer's association in the United States found that a quarter of its members also belonged to the National Association of Home Builders, while forty-four percent were directly involved in contracting.³² They could be very competitive. They typically had better access to credit than the average builder, and so could more easily invest in the sort of modest innovations, such as cutting shops, that could give a marginal competitive advantage.³³ They were better-integrated into industry networks than small builders, and were better informed of prices and new materials. Only the larger builders found it advantageous, or even possible, to bypass them. Some of these purchased their lumber directly from mills; the

largest, including the Levitt brothers and A.V.Jennings, integrated vertically by acquiring their own dealers and suppliers.³⁴

A further element of complexity, and one that has generally resisted study, is the prevalence of subcontracting. This practice has increased in a number of industries in recent years, but has been widespread in the building industry continuously since the nineteenth century. In Britain, subcontracting emerged in the late eighteenth century, and in that country has generally been interpreted as marking the emergence of serious competition, and capitalist enterprise, in the building industry.³⁵ In British towns and cities it seems to have become common during the nineteenth century and was a well-established tradition by the beginning of the twentieth. In North America this development seems to have occurred rather later, although Donna Rilling has shown that subcontracting was common, and became increasingly so, in Philadelphia in the first half of the nineteenth century.³⁶ In Canada, Doucet and Weaver speak of the way one of the larger builders in late nineteenth-century Hamilton, Ontario, used subcontracting to operate “lean.”³⁷ Everywhere, subcontracting made possible a finer division of labour, which improved productivity but eroded craft skills.³⁸

Subcontracting seems to have become steadily even more common through the twentieth century. The only annual data are for Australia in the postwar decades, which show a steady increase in the number of contractors, by comparison with both builders and tradesmen.³⁹ More recently, a systematic study of Canadian builders in 1971 found that about three quarters of the physical tasks associated with home building were subcontracted, a proportion that varied little between small and large builders.⁴⁰ This degree of reliance on contractors seems to have been typical. Bringing their own tools and equipment, subcontractors

used much the same methods on any job, small or large.⁴¹ Although large subcontractors were more likely to work with the larger builders, the prevalence of subcontracting has meant that the homes of small and large builders were erected in much the same way. Builders liked to use the same contractors again and again, once they had proved their reliability, but high rates of entry and exit into the industry guaranteed that the network of relationships remained fluid.⁴² Indeed, many small companies operated as builders on some jobs and contractors on others while tradesmen might set themselves up as contractors. If successful, and especially if carpenters, they might graduate to general contractors; if unsuccessful they might join someone else's crew. The boundaries between workers and small employers were always blurred.⁴³

In all of this complexity, the most obvious fact about house builders is that there have always been so many. By the middle of the twentieth century, some industries were dominated by a handful of companies. In contrast, as an Australian committee, charged with devising a licensing system, noted in 1970, builders have been literally too numerous to count.⁴⁴ The postwar Australian data show that, from the 1940s to the 1960s, the number of workers in the building trades never exceeded the numbers of builders and contractors by a ratio of more than four to one.⁴⁵ Most metropolitan areas could boast several hundred builders and contractors, and in any given year throughout the early postwar era the United States contained more than two hundred thousand, this at a time when there were also about forty thousand distributors of building materials and fifteen thousand manufacturers of building materials.⁴⁶ The numbers in Canada and Australia were correspondingly smaller, of course, roughly in proportion to population, but in each country, the overwhelming majority operated on a very limited scale.⁴⁷ In the United States in 1949, 96 percent of professional builders may fairly be described as

‘small’, starting 25 homes or less; 42 percent were tiny, building just one unit each.⁴⁸ Their market share was less than their numbers might indicate, of course, but never unimportant. In 1949, small builders were responsible for 46 percent of housing starts, a share that had fallen to 22 percent twenty years later, while the share of their Canadian counterparts remained higher, fluctuating around a third from the 1950s to the 1980s.⁴⁹ Indeed, small builders have remained important to the present, despite the emergence of large land developers and merchant builders. In 1997, for example, they accounted for one fifth of housing starts across the United States.⁵⁰ Although the larger companies have attracted a good deal of attention, they have had a significant impact mainly in the larger metropolitan areas. Then again, many have concentrated more on land development, selling blocks and lots to smaller builders. The growing scale of land development, or what Marc Weiss terms community building, has not entailed an equivalent concentration of activity among builders.

One reason why there were so many builders is because it was so easy to become one. Very little capital was required, less than in any other industry, even garments.⁵¹ Maisel found that in San Francisco in the early 1950s small builders had, on the average, \$2,700 in capital equipment, typically a pickup truck and some hand tools; in absolute terms large builders invested more, but less in relation to their labor force or annual turnover.⁵² Because they did most of the actual site work and used their own equipment, contractors required a little more in the way of capital, but still very little in larger comparative terms.⁵³ If it was easy to set oneself up as a builder it was just as easy to leave the industry. Rates of entry and exit have always been unusual, almost always higher than in any other major industry.⁵⁴ A study of home builders in Newcastle, New South Wales, found that during the 1950s and 1960s in an average year at

least a third of home builders had entered the business in the previous twelve months.⁵⁵ This rate of turnover seems to have been typical, and for many decades. No historical data are available for North America, but a recent study of Ontario found that only four of the top fifty builders in 1998 had existed twenty years previously.⁵⁶ House builders, then, have operated in a highly competitive and fluid business environment.

The main features of the industry were broadly constant, but subject to great temporal and geographical instability. There were, and still are, major fluctuations in demand. Housing is expensive; buyers require credit and are sensitive to interest rates. Then, too, houses are flexible: during economic downturns families can double up, adapt their homes, take in lodgers, or add extensions. The demand for new homes can almost dry up, as it did during the early 1930s. Although most commentators have emphasized the less predictable instability of the real estate cycle, year in and year out seasonal fluctuations have mattered even more. Colean's study for the Twentieth Century Fund documented the seasonal variations that were typical in the early 1940s. His employment index on an annual base of 100 ranged from 70 in February to 130 in May. There was, of course a strong regional component to this: California's range (78-118) was less than half that of New England's (30-130).⁵⁷ At their extreme, comparing the late 1920s with the first half of the 1930s, business fluctuations were about as large, but not much greater than those that afflicted some other industries, including producer durables.⁵⁸

The fluctuations in demand and production were even greater than aggregate national figures suggest. Homes were not only erected on-site but also used there. The market varied greatly from place to place. Even during the Depression some markets thrived: Peoria, Illinois, boomed as its largest employer, Caterpillar, won government contracts for heavy equipment.

During the War, the greatest strains and growth occurred in the main centers of defense employment, such as Detroit in the United States and Hamilton in Canada. Afterwards, most cities grew, but among the larger centers none more consistently than those in the western, and later the southern, United States. In Australia one company, A.V.Jennings, could eventually claim to be national. In the United States, however, even the largest merchant builders of the 1950s operated on a regional or, more commonly a local scale: Kaiser in Los Angeles, Eichler in northern California, Levitt in the general vicinity of New York. A similarly fragmented, regional pattern eventually emerged in Canada. Even the largest builders, then, faced a market that was potentially more volatile than the national average, and in many cases much more so. The complex historical geography of the industry served to underline its instability.

Change

Most of the changes that affected housebuilding after 1918 involved the adaptation of existing methods and extension of continuing trends. Wartime shortages encouraged the use of new materials, which the lumber industry liked to refer to as wood ‘substitutes’. Except for wall plaster, these eroded rather than displaced the demand for traditional materials. Occasionally, data are available that enable us to distinguish trends from cycles. The evidence on the size structure of the industry, though imperfect, is relatively good. During the 1950s and 1960s, contemporaries were struck by the growth of large builders. More was involved than size, for merchant builders were compelled to develop new management structures, especially to handle multiple site operations.⁵⁹ Close observers questioned how far this trend could go. As early as

1953, Maisel suggested the larger merchant builders had already reaped most of the available economies of scale and that any further concentration in the industry would have to be accomplished by the growth of medium-sized firms.⁶⁰ Ten years later, Herzog's research appeared to confirm his prediction.⁶¹ Later, however, the concentration of the industry hit limits as markets fragmented. Infill development in gentrifying neighborhoods, and home renovations – both the domain of the small builder and contractor -- became more important. As a result, despite cyclical flux, the size structure of the building industry in the 2000s differs little from that of the 1950s or even the 1930s.

Other important shifts in the industry must be inferred from case studies and the evidence of trade journals. Most close observers, especially in Australia, detected an increased use of subcontracting post-war.⁶² Unfortunately, except for that country, there are no data to confirm their impression. They also noted a secular decline of the general contractor. In 1953, in an uncharacteristically bold statement, Maisel claimed that “yesterday belonged to the contractor ... the merchant builder ... is moving in on tomorrow.”⁶³ This overstatement caught the trend, although merchant builders soon blurred the distinction by erecting model homes and then pre-selling to clients who were given a range of cosmetic options.⁶⁴ There was also a steady increase in the use of machinery, whether by builders, dealers or manufacturers, especially in the partial prefabrication of components, notably door and window assemblies, plumbing ‘trees’ and, following the development of gang-nailing techniques, roof trusses. Because of their reliance on wood technology, the United States and Canada, along with Scandinavia, were leaders in these systems; Australia soon followed.⁶⁵

Larger builders did their own pre-cutting and fabrication, usually on site, but smaller builders relied on lumber dealers for this service.⁶⁶ From the late 1930s through the 1960s, dealer associations encouraged the development of precutting methods which were illustrated and promoted in the trade journals.⁶⁷ It was often the larger dealers that led the way. Edward Hines, for example, a large dealer-wholesaler, claimed to have been the first in the Chicago area to establish a millwork facility, and by the mid-1950s was selling pre-hung doors and glazed windows “to help area builders cut valuable installation time.”⁶⁸ This sort of service soon became common. In the United States, for example, by 1969 more than a quarter of all dealers sold prefabricated roof trusses, in most cases their own.⁶⁹ Pushed, at first, by the boom in owner-building, lumber dealers evolved rapidly. They further diversified their product lines, developing services for the amateur that also enabled small professional builders to compete with their larger competitors.⁷⁰

Fabrication, whether by lumber dealers, large builders, or independent companies such as Thermapane and, in Australia, Stegbar Windowall, transferred labour from the building site to a factory-like setting. A more dramatic example of this trend occurred in the late 1950s and 1960s, when the industry for manufactured (mobile) homes began to take off, especially in the United States. By the beginning of the 1970s, then, the building industry was more complex than ever. In addition to amateurs, general contractors, merchant builders, and a shifting kaleidoscope of subcontractors, there were dealer-builders, prefabricators of building components, and thorough-going manufacturers. In popular perception, the merchant builder had taken over from the contractor as the norm for the industry, but in truth there was no norm.

Contemporary Views

Between the early 1930s and the mid-1950s the building industry experienced enormous strains and came under close public scrutiny. Devastated by the Depression, it was a leading target of the New Deal. Then, as an emerging housing shortage threatened wartime production, the federal government took a direct hand. After 1945, backlogged demand kept house builders in the public eye for another decade. For practical, policy-related reasons, then, and also because the diversity of the building industry made it a litmus test of expert opinion regarding the organisation of manufacturing in general, it is important to consider what observers made of it. The short answer is not much.

Contemporaries could not comprehend the logic of an industry that was so diverse. The majority simply assumed there was no logic. From the 1920s to the 1970s, the building industry received a barrage of criticism and was frequently ridiculed. Humorists such as Ring Lardner and Eric Hodgins poked fun at the general contractor, shown to be by turns shifty and bumbling, at the difficulty of getting subcontractors to do what they were supposed to, and in general at the myriad frustrations of building a home.⁷¹

Housing experts offered a similar and more relentless indictment. In 1950 Charles Abrams, a leading commentator on housebuilding, contributed a chapter on the subject to an edited collection of essays on American industry. Developing *Fortune's* trope, Abrams claimed that “promoters” had “sidestepped the building industry,” that in the late nineteenth century it had emerged as “the backward stepchild of the gilded age of enterprise,” and that builders still had to “fumble along with eighteenth century tools.”⁷² Significantly, in an introduction, the editor

commented that Abrams' criticisms could "hardly be challenged."⁷³ Few tried. Three years later, Sherman Maisel discerned three points of view on the building industry. According to him, all accepted that it was "industrially retarded;" they differed only on the causes and likely solutions.⁷⁴ Some writers tried to deflect attention from the building industry on the grounds that it was not the main reason why housing costs were so high. In the 1920s, for example, Henry Wright, a prominent architect of low-cost housing, pointed out that savings in production were often capitalized into higher land costs. Together with his friend Lewis Mumford, the great urban historian and planner, he argued that experts should devote their energies to improving the planning of subdivisions rather than promoting factory production.⁷⁵ But these arguments did not shake the consensus that the building industry was the key barrier to reducing housing costs.

Concern about costs consistently drove the debate about the building industry. During the Depression, observers believed that cost reductions would revive demand, thereby helping the industry back onto its feet and, through multiplier effects, stimulate the economy as a whole. In the late 1940s and early 1950s, rapid price inflation stymied veterans, threatening to create social unrest and to stall the post-war economic boom. In both periods, the solution was seen to be greater efficiency. This multi-faceted concept referred to the raising of labour productivity, typically through the use of new tools and techniques, capital investment, larger scale operations with a finer division of labour and a tighter scheduling of tasks, coupled with forward planning. Efficiency, then, became the watchword. By comparison, other aspects of industry operations, notably the capacity to respond to fluctuations in the quantity and character of demand, received much more limited attention.

The chorus of criticism regarding the efficiency of the industry was sometimes overwhelming, but from the late 1940s there were also a few dissonant voices. The range of opinion fell into four camps, which corresponded broadly with distinct interest groups and political orientations. The first, largest, and most diverse group, comprising an overall majority, condemned house building as inexcusably and irredeemably backward. Aligning themselves with a corporate model of business efficiency, they emphasized the need to rebuild the building industry from the ground up. A second group of liberal critics emerged in policy circles during the New Deal. Engaged in changing the industry, they attributed its faults to its circumstances. They excused some failings, even as they resolved to eliminate them.

Setting themselves apart from this clamour of criticism, a few contemporaries argued that the way in which the building industry was organised had intrinsic and enduring merits. One group, amounting to no more than a scattering of academics, made their presence felt in the early 1950s. Skeptical not only of the industry but also of the charges against it, they tried to appraise it on its own terms. Finally, builders eventually came to their own defense. Insisting that housebuilding had been unfairly maligned and was already efficient, self-appointed spokesmen claimed that builders had made steady improvements over many decades and, if left alone, were capable of making many more. This fourth group carried little influence at the time, in part because it was so blatantly self-interested, but it was also the best informed and its arguments repay closer attention.

Most adherents of each of these perspectives articulated only a part of the whole view. Although we cite an extensive body of writing, our presentation draws disproportionately on those whose statements were especially comprehensive. This may imply that each view was

more coherent and distinct than in fact it was, but it serves to highlight some important analytical differences.

Corporatist condemnation

There were plenty who condemned the building industry out of hand. In order to emphasize and justify the need for change they cast everything in a negative light. They have not told us much that is now very useful about the industry, but they deserve our full attention because they were so numerous and hence influential. This influence was felt diffusely in the shaping of public opinion, and was most apparent in the framing of federal policy and in the way that the industry itself was kept on the defensive.

Charles Abrams was by no means the first to condemn the industry but, because of his purple prose, he became one of the more influential. The chapter he published in 1950 abbreviated the full denunciation that he had made four years earlier in *The Future of Housing*. Here, he damned the industry for almost every imaginable failure: inefficiency, shoddy workmanship, unfair competition and stagnation, not to mention "waste, monopoly, coercion, usury, petty graft, disorganization, excessive charges and consumer indifference."¹⁷⁶ Although, by comparison with *Fortune*, Abrams trod lightly on the building trades, he did argue that they resisted progressive change through self-interested, as well as mindlessly obstructive, jurisdictional disputes. Here, perhaps, he took the opportunity to vent some of his frustrations as a Manhattan landlord. Building codes, he argued, served the interests of the trades, and once ossified they presented a further barrier to innovation. Because the suppliers and middlemen use

trade restrictions and monopoly practices to force up prices, "the law of supply and demand has obviously not functioned..."¹⁷⁷ The builders themselves, mired in tradition, are the "Cinderella of the capitalist system," earning "the title of 'industry' as a matter of courtesy only."¹⁷⁸ This, like *Fortune's* charge, was a phrase that stuck and, through repetition, became a trope.

The notion that the industry was hopelessly outdated was consistently expressed in policy circles. In 1931, in a report he prepared for the President's Conference on Home Building and Home Ownership, Arthur Holden described construction as "virtually the sole surviving large scale hand industry in a machine age."¹⁷⁹ Seventeen years later the Congressional Joint Committee on Housing repeated Abrams' criticisms, referred to analysis, added the claim of "high profit margins," and declared that "almost all homebuilders are inefficient, small-scale productive units, which would fail completely in any other important industry."¹⁸⁰ Twenty years on, the National Commission on Urban Problems repeated the refrain, speaking of a "handicraft industry" operating in ways that were "common half a century ago."¹⁸¹

Similar views were expressed elsewhere. In Canada, the person who shaped federal housing policy from the mid-1930s to the mid-1950s was W.C.Clark, the Deputy Minister of Finance. In 1938 he presented his thoughts on housing at Dalhousie University. Housebuilding, he judged, was a "localized, handicraft" industry, much the same as "that which catered to our forefathers prior to the Industrial Revolution."¹⁸² It was a "confusion" of contractors and subcontractors, dogged by jurisdictional disputes, "fluctuating markets," "waste," "delays," and unnecessary "loss."¹⁸³ Introducing a Canadian theme, he suggested that in many (suburban) municipalities the problem was not that building codes were outdated but that they did not exist.

The same terms ("handicraft"), criticisms ("restrictive practices"), and the same invidious comparison with other industries was also common currency in Australia.⁸⁴

Such wholesale criticism was not as strongly developed in Britain, perhaps because by the 1920s, indeed by the mid-nineteenth century in the London area, large builders were common.⁸⁵ But this did not mean that the British industry was more efficient. From the 1920s to the 1960s, comparisons showed that the North American industry was superior in almost every way. In 1926, H.C.Badder concluded that American tradesmen were paid more but earned it through greater productivity.⁸⁶ In 1944, a Mission from the British Ministry of Works agreed, and praised how American builders managed subcontracts, paced work, used power tools and standardized components; it also endorsed their reliance on wood, since this lent itself to greater efficiency.⁸⁷ Six years later another expert team amplified the praise, speaking of "complete" pre-planning and a better "industrial climate."⁸⁸ Yet another group was "repeatedly impressed" by the manner in which building materials were distributed, praising the "outstanding ... flexibility" and the possibilities for "integration backward or forward," while concluding that "goods move from producer to user by the most direct practicable course."⁸⁹ Australian visitors praised the same features. In 1955 a team was struck by the organization of both construction and supplies, as well as higher levels of mechanization and labor productivity.⁹⁰ Australian lumber dealers received a wake-up call when, at the invitation of Con Lembke, editor of the *Australian Timber Journal and Building Products Merchandiser*, Art Hood spoke to groups of dealers in Canberra and Brisbane. Hood, long-time editor of the *American Lumberman*, spoke of normal practices in the North American trade. Afterwards, impressed by Hood's emphasis on competitive marketing, one timber merchant commented that "this will

be the greatest shot in the arm that the timber industry in Australia has ever received.”⁹¹ The features that struck outsiders favorably about the North American scene, then, were precisely those that attracted the greatest criticism from domestic observers: project management, subcontracting, reliance on wood, and flexibly complex systems of distribution. The existence of such discrepant assessments indicates that the domestic criticisms of US builders say more about the critics than they do about the industry itself.

In North America, the industry's detractors assumed that the source of the problem were the myriad practices that the industry had inherited and that obstructive self-interest maintained. Speaking from the standpoint of corporate America, *Fortune* railed especially against corruption, jurisdictional disputes and working rules in the construction trades, but more generally deplored the “feudal controls” exerted by tradesmen, suppliers, and subcontractors who, they suggested, were part of a hidebound “putting out” system. John Burchard, first director of the Bemis Foundation for Housing Research at MIT, spoke darkly of a network of “vested interests.”⁹² Entrenched practices were inefficient and vested interests maintained them. Worse, the industry seemed to be a many-headed Hydra. In 1937, speaking as editor of *Architectural Forum* and ex-chief engineer at the FHA, A.C.Shire deplored the “complexity” and “inchoate organization” of an industry that had “no centralizing control, no directing

⁹³ Three years later the Temporary National Economic Committee echoed his frustration. In the Committee’s view the industry was no more than a “haphazard grouping of small independent units” involving “traditions, customs and restraints ... that are difficult to break” because “no one has any effective control.”⁹⁴ Where to begin the process of reform? To break the “building blockade”, as Robert Lasch put it in an influential book published in 1946, the

solution had to be radical.⁹⁵ The goal was to cut the Gordian knot of “guild controls” at a stroke.⁹⁶

The solution to housebuilding’s problems was to jolt it into the twentieth century, to remake it as a mass-production industry appropriate to the Machine Age. “The housebuilding industry,” declared the Joint Congressional committee on housing in 1948 “needs to be reorganized and put on a modern industrial basis.”⁹⁷ Everyone agreed that large-scale operations were critical.⁹⁸ Big builders could reap economies of scale, buy in bulk, and cut out the middlemen by buying direct from manufacturers. They could integrate vertically or, for as long as they continued to employ subcontractors, their greater size would enable them to drive a better bargain, push down prices, and in general take charge. Centralizing capital, they would be able to invest in new equipment, raising productivity. For many, inspired by the German modernist architect Walter Gropius, and the Bauhaus school that he founded, the ideal was “prefabrication”, by which they meant the factory home.⁹⁹ During the early 1930s this was the great hope of the industry. Alfred Sloan, President of General Motors, even expressed the view that a new industry of “machine-made homes” would pull America out of the Depression.¹⁰⁰ New companies experimented with varied techniques and materials, including wood, steel, and concrete. These attracted enormous media attention, found support from the Federal Housing Administration, and received the *imprimatur* of experts at the Bemis Foundation, first John Burchard and later Burnham Kelly.¹⁰¹ Investors remained skeptical, however, and during and after the War, the federal government spent millions of dollars in subsidizing the startup costs of selected experiments, most notably the Lustron steel house. Many were ingenious and some proved technically feasible, but none got off the ground. Although many observers worried

about consumer acceptance, the main problem was distribution.¹⁰² Recognizing that a total restructuring of the industry might take time a growing number of observers came to argue that most of the benefits of mass production could be obtained even with continued on-site assembly. These included Charles Abrams and, in Canada, H.C. Clark.¹⁰³ Their goal became the standardization of parts, together with the prefabrication of components, subassemblies and mechanical units, preferably on as large a scale as possible. This would be a long first step towards wholesale modernization. Ideally, little of the existing industry would remain.

Liberal Criticism

Those who condemned the industry outright had composed a litany of complaints, which created difficulties when it came to proposing viable solutions. From the New Deal onwards, those whose job it was to make practical policies were compelled to identify specific features of the industry that they could plausibly hope to manipulate. These liberal critics singled out key problems, related these to the peculiar character of the market for housing, and proposed more selective solutions. In the United States, the leading exponent of this point of view was Miles Colean.

By the 1940s there was probably no one in the United States better qualified to pass judgement on the building industry than Miles Colean. From 1934 to 1940 he had worked at the Federal Housing Administration, first as its technical director and then as its Assistant Administrator. In these capacities he had ample opportunity to see the industry close up, and to debate views with the leading housing experts of the day, including Ernest Fisher, Richard

Ratcliff and Coleman Woodbury. For the next two years he directed the housing survey of the Twentieth Century Fund, and later advised the Producers Council. In the report that he wrote for the Fund, Colean agreed with the popular consensus that the building industry had "numerous deficiencies in organization and techniques," that it was "poorly organised," "chaotic," "backward" and, in sum, "old but not mature."¹⁰⁴ But he also acknowledged its "quiet, steady progress."¹⁰⁵ Indeed, as he observed the industry's development during the 1940s he acquired increasing respect for it. By the early 1950s he was insisting it had been "ingenious and successful in adapting itself to its operating environment."¹⁰⁶ The problem, he concluded, lay not with the industry but with the environment of instability in which it had always functioned.

Together with Robinson Newcomb, he explored the implications of demand instability in *Stabilizing Construction*, a book that he wrote at the behest of the Committee for Economic Development. Because the demand for housing was both local and highly cyclical, Colean and Newcomb argued, it was just as important for builders to be flexible -- and agile, in today's terminology -- as it was for them to be efficient.¹⁰⁷ To respond effectively to rapid booms or downturns builders had to be nimble and lean. Payrolls, equipment and factories were a liability; instead, subcontracting, hand tools, and on-site assembly was the way to go. With this disincentive to invest, builders remained small, inefficient, and under-capitalised, hence reliant on middlemen. Faced with market uncertainty, it was no wonder that tradesmen and suppliers tried to protect themselves through restrictive practices. These characteristics all presented barriers to efficiency, but they made sense.

Although they did not explore the logic of the argument as fully as Colean and Newcomb, a number of other observers believed that market instability was an important

concern. This belief has consistently influenced policy debates in Canada, the United States, and Australia. In Canada, for example, it was expressed by the housing committee of the Canadian Welfare Council, a group that included academics as well as representatives from the labour movement and mortgage lenders.¹⁰⁸ In Australia it shaped the policies of the Commonwealth Housing Commission, which sought to stabilize demand and promote the growth of large builders by providing them with government contracts.¹⁰⁹ In the United States it guided the housing recommendations of the National Commission on Urban Problems in 1968.¹¹⁰ Indeed, it has been consistently articulated by observers of the building scene, both in North America and in Australia.¹¹¹

If instability was the source of the building industry's problems, it was the key target for any solution. Two possibilities were discussed. The first was to use public contracts to nurture large builders and dampen the cyclical swings of the private market. This point of view was argued by the public housing lobby in Australia, Canada and the United States, including the Canadian Welfare Council and, perhaps most notably, Catherine Bauer, one of the leading US advocate of public housing.¹¹² It was only implemented on a significant scale, however, in Australia, and even then mainly in the late 1940s and 1950s when private-sector demand was also strong. The alternative option, personally favored by Colean, was to strengthen the private sector so that it might ride through, and even out, any downswings. Apart from broad macro-economic measures, this typically involved the promotion of larger operative builders whose long-range planning horizon could respond in a measured way to faltering demand and even, with judicious planning, counter it.¹¹³

In the end, the policy recommendations of the critics meshed quite closely with those of the detractors. Colean's account provided a temporary rationale for some of the key industry features that its detractors had simply deplored: subcontracting was shown to have a powerful logic; although "wasteful," middlemen performed necessary "functions".¹¹⁴ In the short run, at any rate, there might have to be "a variety of solutions" to the challenges of restructuring. But, in the long run, the peculiar business environment in which housebuilding operated was still seen as a barrier to be overcome. The industry was excused, but not pardoned.

Disinterested Skeptics

Those who condemned or criticised the building industry were virtually unchallenged from the 1920s to the early 1950s. As the industry geared up in the 1940s, however, it changed, and close observers began to pay attention. Colean adjusted his views, but still saw the industry's operating environment as a barrier to realizing the ideal. Others were more inclined to believe that some features of this environment were immutable, and that some of the industry's main features might be seen as permanent and rational adaptations.

The first sustained expression of this more favorable view was *Production of New Housing* (1950), a monograph commissioned from Leo Grebler by the Committee on Housing Research of the Social Science Research Council.¹¹⁵ As was typical, Grebler focused on the issue of efficiency, surveyed what was known about residential construction, and suggested questions for future research. Given the contempt with which many regarded the industry, his treatment is remarkable for its level tone and agnostic views. On most key issues --

subcontracting, rates of innovation, levels of productivity, and the distribution of materials -- he retained an open mind, emphasized the absence of firm evidence, and the need for research. On contracting, for example, he suggested that there must be "at least a strong presumption that it developed in response to economic forces" and that whether it made sense depended on the context. Regarding the supply of materials he insisted that "research in this field cannot take for granted the validity of any position for or against existing distribution patterns and practices..." even on the issue of efficiency he pointed out that the advantages of increasing size may often have been outweighed by the disadvantages, among which he included the greater costs of overhead, the need to maintain inventories, and the challenges of maintaining flexibility in the face of change.¹¹⁶ Grebler did not express his own views, and for that reason his presentation is unsatisfying, but his dispassionate tone is refreshing.

A more satisfying statement, because it provided well-grounded answers, was soon articulated by Sherman Maisel. In the late 1940s, the US Housing and Home Finance Agency funded a number of case studies of home building and finance in local markets across the country. Maisel's study of housebuilding in San Francisco was the most significant, in part because he did not feel constrained to adopt the prejudices of those who had hired his expertise. Relying on interviews as well as published data, Maisel produced a detailed account of the structure and organization of the local industry, and of its relationship to suppliers and lenders. Acknowledging that previous writers had been highly critical of this "most troubled and troublesome" industry, he conceded some deficiencies, especially in management.¹¹⁷ But he argued that his evidence supported a generally favorable assessment. His finding that subcontracting was efficient, and that builders established stable relationships with their

subcontractors, "contradicted ... many popular assumptions."¹¹⁸ His evidence showed that dealers performed many necessary services and that they gave professional customers a fair discount; indeed, among suppliers he found "more vigorous competition than is true in most parts of the economy."¹¹⁹ The financial data that he obtained showed that the production costs of the large builders were lower than those of the small, but that this advantage was largely absorbed in greater overhead.¹²⁰ For this reason, he calculated that the upper limit to economies of scale was quite low.¹²¹ Overall, he found "far greater efficiency and stability than is commonly recognized," and concluded by commenting that, as the praise of outsiders also indicated, most judgements of the North American housebuilder said more about the critics than the industry.¹²²

Few other commentators paid close attention to Maisel's evidence, or agreed with his conclusions. Later writers did confirm parts of his assessment of the industry, for example his suggestion regarding the limits to economies of scale.¹²³ Some, including government agencies, acknowledged the virtues of subcontracting. In 1952, for example, in a report on the advantages of "standardization, simplification, specialization in the building industry," the U.S. Bureau of Labor Statistics included four case studies of subcontracting, some possibly drawn from Maisel's research.¹²⁴ Perhaps the only writers to extend Maisel's analysis during the 1950s were William Haber and Harold Levinson, whose work was also supported by the HHFA. In *Labor Relations and Productivity in the Building Trades*, they updated Haber's earlier analysis of the building trades.¹²⁵ Dealing with labor issues that Maisel had barely touched, they agreed that technical improvements had been "impressive," and that subcontracting was efficient, making it possible for small builders to compete with large.¹²⁶ They also argued forcefully that it was unfair to compare the efficiency of small and large builders without taking into account the

fact that smaller builders typically erected homes on scattered sites and therefore had to deal with greater logistical difficulties.¹²⁷ As the boom of the 1950s slowly caught up with the housing shortage, however, interest in the building industry waned, and so Maisel's work – together with his balanced view of the industry -- fell into neglect.

The Industry's Defenders

The research of Haber and Levinson, but above all Maisel, rationalized many of the key traditional elements in the organization and methods of the building industry. It provided evidence to support arguments that defenders of the industry had begun to make during the 1940s. These defenders were connected with the industry, however, and few were taken seriously by housing experts and agencies.

The most articulate defenders of the building industry were trade associations and the editors of trade journals. Aware of the unpopularity of the industry, editors chivvied their subscribers into adopting new methods by running features on 'progressive' companies. *American Builder* and *Canadian Builder* (1952-), were targeted at, and featured, speculative builders who operated on at least a moderate scale. It was the journals for building suppliers, including *Building Supply News*, *The American Lumberman*, *The Canadian Lumberman*, and *The Australian Timber Journal*, that spoke for the most traditional elements in the industry, the lumber dealers together with the general contractors who were their bread and butter business.¹²⁸ The editors of these journals, notably Art Hood at the *American*

Lumberman and Con Lembke at the *Australian Timber Journal*, pushed their subscribers to modernize, defended their interests and articulated their point of view.

Trade journals and associations were very defensive during the 1930s, but by the late 1940s were articulating an upbeat image of the industry.¹²⁹ They argued that it was innovative and flexible. In particular they insisted that, together, dealers and small builders could produce homes just as efficiently as the larger merchant builders who bought direct. In his response to *Fortune's* criticisms in 1947, for example, the editor of *Building Supply News* argued that, with "a little coordination at the local level ... any smart local dealer or builder" could achieve "economies plus consumer acceptability" that were superior to those of any large builder or prefabricator.¹³⁰ The trade journals claimed that dealers could do this by offering a one-stop warehousing/supply service, 30-day credit, technical advice and assistance, just-in-time delivery to building sites, and precutting, the major development of the early post-war period. A number of the U.S. companies that experimented with prefabrication in the early post-war period relied on tried-and-tested wood framing technology; their kits were mostly sold through dealers, and in about half of all cases actually erected by dealers too.¹³¹ More importantly, the National Retail Lumber Dealer's Association developed a series of proprietary precutting systems. The idea, as they put it in 1947, was "to counterract the unfounded dreams of push-button theorists who were leading the American people to expect post-war homes built of untried materials not yet in production."¹³² The same trend swept Canada and, soon, Australia too.

The published elements of this argument were scattered across scores of articles. The most concise and accessible version was articulated by Fred Ludwig. Ludwig had for many years been general manager of the Merritt Lumber Yards in Reading, Pa., before taking a

position as a mortgage broker. In 1944 he was invited to participate in the National Conference on Post-war Housing, where he spoke on "The Efficiency of the Small Builder."¹³³

Acknowledging the critical role of the dealer, he argued that, with minimal overhead, using proven contractors, and capitalizing on an established local reputation, small builders were just as efficient as the large. Judging from the published discussion afterwards, his message was ignored, possibly because his audience thought it was both self-serving and wrongheaded. It was impossible to argue the same of David Bohannon. One of the first of the large merchant builders to emerge on the west coast during the 1940s, Bohannon made news in 1946 by commenting that the savings that he was able to make in production costs was "more than absorbed" by his increased overhead.¹³⁴ He had already expressed this view in *American Builder* and, in a highly laudatory article about Bohannon's use of the innovatory "California method" of precutting, *Fortune* acknowledged the point.¹³⁵ They buried it towards the end of the article, however, and did not pursue the implications. Neither Ludwig, Bohannon, nor Maisel could puncture the public and expert consensus that the building industry was hopelessly inefficient.

Indeed, after the late 1940s and early 1950s when the critics and detractors of the building industry had become more restrained, in the 1960s they returned with redoubled force. In the early 1950s some of the more extravagant claims for machine-made houses were qualified. In 1952, for example, Burnham Kelly conceded that this ambitious project was still a "struggling[,] growing infant;" he acknowledged that it could not be the only solution.¹³⁶ Still, however, he called for a "fundamental improvement" in methods.¹³⁷ Then, in the 1960s, a new generation rejuvenated the technological optimism of the 1930s and early 1940s. The Civilian

Industrial Technology Program (CITP) again sought to revolutionize the industry.¹³⁸ Following the recommendations of the National Commission on Urban Problems, the US federal government mounted Operation Breakthrough, an ambitious program to jump start the market for manufactured housing. The thinking was unchanged from the technological determinism of the early 1930s. The Commission's report waxed enthusiastic about the "amazing success" of mobile homes; it spoke of the advantages of factory fabrication and of "barriers" to be overcome, with no suggestion that there might be corresponding disadvantages of inflexibility, or immutable limitations.¹³⁹ The implication was that universal, large-scale, off-site production was a realistic goal. In some respects the rhetoric had become even more overheated. Along with many others, *Fortune* had described the industry as feudal; HUD Secretary George Romney went further, invoking images of the Stone Age. Endorsing Operation Breakthrough, he claimed that recent and prospective changes meant "a revolution in housing construction unmatched since men came out of the caves and started building dwellings with their hands."¹⁴⁰ Even as Operation Breakthrough struggled, many writers still bought the rhetoric arguing that a revolution was necessary.¹⁴¹ In 1971 Dorothy Nelkin attributed the failure of the CITP program entirely to hidebound, self-interested obstructionism by the industry.¹⁴² She did not entertain the possibility that the industry might already be functioning well without technological revolution. W.D.Keating, speaking about industry trends in 1973, saw the current period as "transitional" to a new corporate era, and reported without comment Boise-Cascade's view that within five years "50 percent or more of U.S. housing will be built in factories."¹⁴³ The ideals of the machine age lived on into the early 1970s.

Discussion

From the 1920s to the early 1970s the benchmark for the building industry was a specific ideal of mass production. In its essentials this ideal called for the heavily-capitalized, large-scale fabrication of a limited range of dwelling types using standardized parts and dimensions on factory assembly lines. For many decades the automobile industry was invariably invoked as the model. In the 1920s the department store magnate Edward Filene spoke of making "Houses Like Fords," Henry Wright played with the idea of the "Six Cylinder House with Streamline Body," and Robert Davison compared construction cost indexes for homes and Fords.¹⁴⁴ In 1932 John Murchison articulated what had already become a tired comparison when he declared that "what Ford has done in the automotive industry is what must be done in the housing industry."¹⁴⁵ Then, reversing the usual direction of comparison the architect Alfred Kastner commented that "...if Mr.Ford's designers used the thought-process of traditional architecture we should undoubtedly be riding around today in small copies of King George's coronation coach."¹⁴⁶ Only in the 1960s did the point of comparison change, to aerospace, but the theoretical ideal remained the same.¹⁴⁷

Every contemporary acknowledged the force of this ideal. Most viewed it literally as the goal. A few were unsure that factory production was realistic for the building industry, but still used it as the benchmark against which they framed their arguments. The same was even true for the industry's defenders: they had no choice but to meet their opponents on their own ground. There are intriguing questions about how different groups within the building industry

viewed, understood, and used the discourse of mass production in order to press their own interests with the federal government. We need to know more about how this discourse shaped, and was shaped by, the social mechanisms by which the ideal became so effective. But there can be no question about its pervasive influence.

Historians of housebuilding have not replaced, disrupted, or even seriously questioned the discourse of modernisation. Those who deal with house building as part of a larger story, usually of suburban development, have simply accepted the views of contemporary detractors and critics. Sometimes this acceptance is embarrassingly uncritical and wholehearted. In their account of "how the suburbs happened," for example, the sociologists Rosalyn Baxandall and Elizabeth Ewen focus a large part of their narrative on one of the three huge suburbs built by the Levitt brothers. Describing William Levitt as "fabulously successful," the "Henry Ford of housing," they assert that his company "transformed the housing industry from small scale to large scale, from an industry relying on craft methods to one that used the latest industrial techniques."¹⁴⁸ Their account is wrong on all counts. Levitt did not transform the industry in the manner of Henry Ford. Neither he nor any other builder in that era operated on the scale that would have made that possible. Indeed, the industry was not transformed: small builders persisted and building methods evolved. Meanwhile, after initial success, Levitt ran into serious trouble. As Ned Eichler points out, by concentrating so heavily on immense projects he had never been typical of the larger merchant builders. His was a risky business plan, and by the 1970s he was effectively bankrupt. But it would be invidious to single out Baxandall and Ewen's account for criticism. Many other historians have made similarly inaccurate statements or, by extolling the merits of large-scale production, implied them.¹⁴⁹ At most they have dissented from

specific claims that detractors made. Their thinking has confined itself within the discourse of mass production.

The elements of an alternative view will have to be pieced together from two bodies of writing that until now have been largely unrelated. The first is the work of those who have written about the current housing scene. In the United States, several observers have suggested that the housing industry should be regarded as a model of flexible efficiency. Francis Ventre, for example, speaks of its "genius of ... adaptive ... response" while, in a comparative study of Long Island and suburban Chicago, Ronald Denowitz has explored the way in which varied market conditions can create different, but equally efficient, industry responses.¹⁵⁰ This way of thinking has been more fully articulated in Britain and Australia, initially during the 1970s and 1980s by Michael Ball and other researchers who were associated with the Bartlett School at the University of London.¹⁵¹ Indeed, it has been suggested that instead of building houses like cars we might try building cars like houses.¹⁵² In this connection, it is noteworthy that in Japan, the country that pioneered some of the modern techniques of flexible production, custom building is still the norm for single family homes and even the largest builders have been compelled to employ methods of mass customisation.¹⁵³ Perhaps the most significant development occurred in 1993 when a group of industry professionals formed the International Group for Lean Construction (IGLC), the purpose of which is to theorise the ways in which the flexibly efficient methods of the industry might be further developed, rather than discarded.¹⁵⁴ The work of these writers and professionals challenges the view that the modern housing industry is backward, and that it must be viewed through a single lens.

In order to develop an alternative and we believe better lens, especially for viewing the past, we may also draw on the growing body of work in business history concerning the 'other side' of industrialization.¹⁵⁵ Scranton's work, with its recognition that there may be "multiple correct solutions" to the problem of production, is an especially appropriate starting point for analysis of an industry that grew even more diverse over the course of the twentieth century.¹⁵⁶ His identification of four types of production for the market, and the manner in which they often resolve themselves into two, 'special' and 'duplicate,' has suggestive parallels to the continuing distinction between general contractors and speculative builders.¹⁵⁷ It is paralleled and in some respects extended by those that have taken place within the IGLC about what has been called the 'decoupling point,' the stage in the production process at which a dwelling begins to be customised.¹⁵⁸ Scranton's subsequent discussion of markets is part of a broader trend towards a consideration of how production and consumption have been interrelated through the mechanisms of marketing and distribution.¹⁵⁹ Given that the market for housing is so dispersed and fragmented, and that so many observers have identified market instability as a major issue, such lines of inquiry have much to offer for our understanding of the housing industry.

We must resist the notion that, because it is in so many ways unusual, the housebuilding industry is a law unto itself. This way of thinking appeared to make sense to those who held mass production as an ideal, and who implied that deviations were both regrettable and relatively uncommon. Many of the most influential statements on the subject are careful to enumerate the ways in which housing, and house building, is unique.¹⁶⁰ But one of the important lessons to be drawn from historical research on the history of business is that few, if any, industries have ever conformed to the ideal of mass production.¹⁶¹ Flexible production methods,

of the sort that have often seemed to dominate housebuilding, have been present everywhere; they are necessary for any enterprise or industry. From that point of view, housebuilding is not *sui generis*, but simply falls close to one end of a continuum, or to one corner of an n-dimensional space. It follows that a balanced historical account of this industry illuminates larger issues of theoretical debate concerning the process of economic change that affect all industries.

House building in North America and Australia was not forgotten by capitalism, or starved of entrepreneurial initiative. Builders and their suppliers adapted ceaselessly to a fluid and unstable economic environment. They refined a congeries of methods that some have labeled flexible production, methods that have been variously important, but continuously present, in every industry. They deserve our attention for many reasons, but above all because their industry exemplifies these methods on a scale that has had few, if any, parallels. Contemporaries and historians have assumed that the industry has had something to learn; we believe that, to the contrary, that it has something to teach.

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Notes

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- ² Editors of Fortune, "The Industry Capitalism Forgot," 36 (August 1947), 61-7, 167-70.
- ³ U.S.Congress. Joint Committee on Housing. *High Cost of Housing* (Washington, 1948), 133-34;
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¹⁰ Sam Bass Warner, *Streetcar Suburbs. The Process of Growth in Boston, 1870-1900* (Cambridge, Mass., 1962); Marc A. Weiss, *The Rise of the Community Builders. The American Real Estate Industry and Urban Land Planning* (New York, 1987); Emily Clark and Patrick Ashley, "The Merchant Prince of Cornville," *Chicago History* 21 (1992), 4-19; William S. Worley, *J.C. Nichols and the Shaping of Kansas City* (Columbia, MO, 1990); Greg Hise, *Magnetic Los Angeles. Planning the Twentieth-Century Metropolis* (Baltimore, 1997); Ned Eichler, *The Merchant Builders* (Cambridge, Mass., 1982); Barbara M. Kelly, *Expanding the American Dream. Building and Rebuilding Levittown* (Albany, NY, 1993). See also Leo Grebler, *Large Scale Housing and Real Estate Firms. Analysis of a New Business Enterprise* (New York, 1973). The notable Australian example is Donald S. Garden, *Builders to the Nation. The A.V. Jennings Story* (Melbourne, 1992). Canadian studies include Ross Paterson, "The Development of an Interwar Suburb. Kingsway Park, Etobicoke," *Urban History Review* 13,3 (1985), 225-235; John Sewell, *The Shape of the City. Toronto Struggles with Modern Planning* (Toronto, 1993), 79-96.

¹¹ Gerrylynn K. Roberts, "Building Types and Construction." In *American Cities and Technology. Wilderness to Wired City*. Eds. Gerrylynn K. Roberts and Philip Steadman (London, 1999), 102-3.

¹² Michael Doucet and John Weaver, *Housing the North American City* (Montreal and Kingston, 1991), 83, 210-12, 215, 225; Tony Dingle, "Self-Help and Cooperation in Postwar Australia," *Housing Studies* 14,3 (May 1999), 341-354; Graham Holland, *Emoh Ruo. Owner-Building in Sydney* (Sydney, 1988); Richard Harris, *Unplanned Suburbs. Toronto's American Tragedy, 1900-1950* (Baltimore, 1996); Richard Harris, *Creeping Conformity. Canada Became Suburban, 1900-1960* (Toronto, forthcoming).

¹³ Sherman Maisel, *Housebuilding in Transition* (Berkeley and Los Angeles, 1953), 4.

¹⁴ Miles Colean, *American Housing. Problems and Prospects* (New York, 1944), 38-46; Miles Colean and Robinson Newcomb, *Stabilizing Construction. The Record and the Potential* (New York, 1952), 22-35.

¹⁵ John Herzog, "Structural Change in the Housebuilding Industry," *Land Economics* 39 (1963), 137, 140. See also Herzog, *The Dynamics of Large-Scale Housebuilding*. Research Report No.22, Institute of Business Research, University of California, Berkeley.

¹⁶ Grebler, *Large Scale Housing*, xiii.

¹⁷ Schlesinger and Erlich, "Housing," 153, 162.

¹⁸ James Gillies and Frank Mittelbach, *Management in the Light Construction Industry*. Real Estate Research Program, Graduate School of Business Administration, University of California, Berkeley.

¹⁹ Colean, *American Housing*, 131.

²⁰ Dorothy Nelkin, *The Politics of Housing Innovation. The Fate of the Civilian Industrial Technology Program* (Ithaca, 1971), 2.

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- ²¹ Donald A Schon, *Technology and Change. The New Heraclitis* (New York, 1967), 156.
- ²² *Ibid.*, 157.
- ²³ Clark and Ashley, "Merchant Prince;" Daniel J. Prosser, "Chicago and the Bungalow Boom of the 1920s," *Chicago History X* (1981), 86-95.
- ²⁴ Doucet and Weaver, *Housing the North American City*, 217, 238.
- ²⁵ Harris, "The Making of American Suburbs;" G.H.Dietz, Castle N. Day and Burnham Kelly, "Current
Design and the Production of Houses (New York, 1959), 137-87;
Colean and Newcomb, *Stabilizing Construction*, 78-81; Duccio A. Turin, "Building as a Process,"
Transactions of the Bartlett Society 6 (1967-78): 85-103.
- ²⁶ TIME and Architectural Forum, *Home Building under Titles II and III of the National Housing Act* (New York, 1934), 10.
- ²⁷ U.S.Department of Labor, *Structure of the Residential Building Industry in 1949*. Bulletin No.1170 (Washington, 1954); cf. Harris, "The Making of American Suburbs," 101
- ²⁸ Dingle, "Self-Help and Co-operation;" Alastair Greig, *The Stuff Dreams Are Made Of. Housing Provision in Australia, 1945-1960* (Melbourne, 1995), 71-2; Holland, *Emoh Ruo*. Similar rates probably prevailed in Canada. See Harris, *Creeping Conformity*.
- ²⁹ Richard Harris, "'To Market! To Market!' The Changing Role of the Australian Timber Merchant, 1945-
Australian Economic History Review 40,1 (March 2000), 22-50.
- ³⁰ Ovid M. Butler, *The Distribution of Softwood Lumber in the Middle West. Retail Distribution*. Studies of the Lumber Industry Part IX. U.S.Department of Agriculture (Washington, D.C., 1918), 95; George Franz, *A Centennial History. Eastern Building Materials Dealers' Association, 1892-1992* (Virginia Beach, Va., 1992), 64; Arthur A. Hood, *Profitable Lumber Retailing* (Mount Morris, Ill., 1928), 125 ff; Fred H. Ludwig, *The Retail Lumber Dealer and How He Functions*, Lumber Industry Series VII, School of Forestry, Yale University; "Meeting Mail Order Competition in Your Town," *Canadian Lumberman* 47 (1 Feb. 1927), 41; National Retail Lumber Dealers Association, *Inside the Retail Lumber and Building Materials Industry* (Washington, D.C., 1952), 1; J.D.Francis and Associates, *Western Retail Lumberman's Association* (Winnipeg, 1965), 15.
- ³¹ Harris, "To Market!," 46
- ³² National Lumber and Building Material Dealers' Association, *Dealer Profile Study*, (Washington, D.C., 1969), 8-9. Home building by lumber dealers was a long tradition. See, for example, "Texas Dealer finds that
Building Supply News 45 (Aug.1933), 47; "Dealers Build the Houses," *Building Supply News* 70 (Feb. 1946), 81.
- ³³ "A Pre-Cut Framing System for Low Cost Homes," *Building Supply News* 56 (May 1939), 56, 58, 60, 70; Andrew Sokol, *Contractor or Manipulator? A Guide to Construction Financing from Beginning of Construction to Completion* (Coral Gables, 1968), 26.

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- ³⁴ Kelly, *Expanding*, 26-7; Garden, *Builders to the Nation*, 57.
- ³⁵ Michael Ball, "The Development of Capitalism in Housing Provision," *International Journal of Urban and Regional Research* 5 (1981), 145-177; Marion Bowley, *The British Building Industry. Four Studies in Response and Resistance to Change* (Cambridge, 1966), 334-7; Linda Clark, *Building Capitalism. Historical Change and the Labour Process in the Production of the Built Environment* (Routledge, 1992); Akira Satoh, *Building in Britain. The Origins of a Modern Industry* (Aldershot, 1995).
- ³⁶ Donna J. Rilling, *Making Houses, Crafting Capitalism. Builders in Philadelphia, 1790-1850* (Philadelphia, 2001). On Australia see John Hutton, *Building and Construction in Australia* (Melbourne, 1970), 81-83, 94-95; R. Walsh, *The Housebuilding Industry in New South Wales*, Hunter Valley Research Foundation, Monograph No.3 (Newcastle, NSW, 1972), 3.
- ³⁷ Doucet and Weaver, *Housing the North American City*, 83.
- ³⁸ Mark Silver, *Under Construction. Work and Alienation in the Building Trades* (Albany, 1986).
- ³⁹ Max Neutze, *Urban Development in Australia. A Descriptive Analysis*. (Sydney, 1977).
- ⁴⁰ C.J.B. Roberts, *The Survey of the Homebuilding Industry* (Ottawa, 1971), A52.
- ⁴¹ Maisel, *Housebuilding in Transition*, 118-9.
- ⁴² Roberts, *Homebuilding Industry*, A56.
- ⁴³ Walsh, *Housebuilding Industry*, 17; Solomon Rawin, "The Contractor in the House-Building Industry." *Canadian Review of Sociology and Anthropology* 1 (1964), 69-78. For an autobiographical account that illustrates this point see Frank Colantino, *From the Ground Up. An Italian Immigrant's Story* (Toronto, 1997).
- ⁴⁴ New South Wales. Legislative Assembly, *Report from the Select Committee Upon the Building Industry* (Sydney, 1970), 8.
- ⁴⁵ Harris, "To Market!", pp.28-29.
- ⁴⁶ Colean and Newcomb, *Stabilizing Construction*, 99.
- ⁴⁷ For discussion and US data see Colean, *American Housing*, 64-66, 75ff; Colean and Newcomb, 90-108; A.C.Findlay, "Builders of 1-Family Houses in 11 Defense Areas, 1940 and 1941," *Monthly Labor Review* 56 (April 1943), 801-807; Leo Grebler, *Production of New Housing*, (New York, 1950), 34-7; Maisel, *Housebuilding in Transition*, 20-26; Kathryn R. Murphy, "Builders of New One-Family Houses, 1955-56," *Construction Review* 4, 8-9 (Aug.-Sept., 1958), 5-15; Michael Sumichrast and Sara A. Frankel, *Profile of the Builder and His Industry* (Washington, D.C., 1970); U.S. Bureau of Labor Statistics, "Builders of 1-Family Houses in 72 Cities," *Monthly Labor Review* 51 (Sept.1940), 732-743, and "Operations of Urban Home
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Residential Building Industry. On Australia see Alastair Greig, "Structure, Organization and Skill Formation in the Australian Housing Industry," *Background Paper No.13*, National Housing Strategy, Commonwealth Department of Health, Housing and Community Affairs (Canberra, 1992); Greig, *Dreams*, 69-79; Hutton, *Building and Construction in Australia*, 83-87. On Canada see Michael Buzzelli, "Firm Size Structure in North American Housebuilding. Persistent Deconcentration, 1945-98," *Environment and Planning A* 33 (2001), 533-550; Clayton Research Associates, *The Housing Industry. Perspective and Prospective* (Ottawa, 1989); James McKellar, "Building Technology and the Production Process," in *House, Home and Community. Progress in Housing Canadians, 1945-1986*, ed. John Miron (Montreal and Kingston, 1993), 136-154; Roberts, *Homebuilding Industry*.

⁴⁸ Buzzelli, "Firm Size Structure," 538.

⁴⁹ *Ibid.*, 539-540.

⁵⁰ *Ibid.*, 539.

⁵¹ Colean, *American Housing*, 82.

⁵² Maisel, *Housebuilding in Transition*, 39, 103.

⁵³ Colean, *American Housing*, 83.

⁵⁴ Colean and Newcomb, *Stabilizing Construction*, 274-5.

⁵⁵ Walsh, *Housebuilding Industry*, 12, 103. Similar rates of entry and exit have been found in Ontario in the 1980s and 1990s. Michael Buzzelli and Richard Harris, "Market Instability and Firm Transience. Flexibility and Turnover in Housebuilding in Ontario, 1978-1998." Unpubl. ms.

⁵⁶ Buzzelli, "Firm Size Structure," 547.

⁵⁷ Colean, *American Housing*, 87.

⁵⁸ Colean and Newcomb, *Stabilizing Construction*, 19.

⁵⁹ Eichler, *Merchant Builders*, 66; Gillies and Mittelbach, *Light Construction Industry*, 91.

⁶⁰ Maisel, *Housebuilding in Transition*, 217, 219.

⁶¹ Herzog, *The Dynamics*, 78-9. Cf. Eichler, *Merchant Builders*, 125.

⁶² Herzog, *The Dynamics*, 79; Gillies and Mittelbach, *Light Construction Industry*, 92. On Australia see J.D.Boyd, "The Development of Modern Methods of Timber House Construction. Part 1. *Australian Timber Journal* 24, 11 (Dec. 1958), 23; Greig, *Dreams*, 75-7; Hutton, *Building and Construction in Australia*, 29-31; Glenn Maggs, "Labour Process and the Culture of Skill. Domestic Housing Construction in Victoria. Unpubl. PhD, Deakin University, 1995, 74, 78-9; Walsh, *Housebuilding Industry*, 1.

⁶³ Maisel, *Housebuilding in Transition*, 20.

⁶⁴ Bayard O. Wheeler, "Financing House Construction in the Northwest," *Housing Research Paper No.17*, US Housing and Home Finance Agency (Washington, 1951), 11; Dietz, "Current Patterns of Fabrication;" Eichler, *Merchant Builders*, pp.21-22.

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- ⁶⁵ U.S. National Commission on Urban Problems, *Building the American City* (Washington, 1968), 433-4; U.N. Economic Commission for Europe, *Government Policies and the Cost of Housing* (Geneva, 1959), 33.
- ⁶⁶ Walsh, *Housebuilding Industry*, 38-40; cf. Greig, *Dreams*, 86-7.
- ⁶⁷ See, for example, "A Pre-Cut Framing System for Low Cost Homes," *Building Supply News* 56,5 (May 1939), 56, 58, 60, 70; "New Techniques to Bring Lower Costs," *American Builder* 65, 10 (Oct. 1943), 100; "Custom Construction Through Mass Production – Prefab System for Lumber Dealers," *Building Supply News* 73,2 (Aug. 1947), 92-3; "Lu-Re-Co Proves Three Times Faster Than Conventional Building," *Building Supply News* 98,6 (June 1960), 134-7.
- ⁶⁸ Edward Hines Lumber, *Building a Tradition in Chicagoland for 100 Years* (Chicago, 1992), 11.
- ⁶⁹ National Lumber and Building Material Dealers' Association, *Dealer Profile Study*, 14-15.
- ⁷⁰ Harris, "To Market! To Market!"; Arthur A. Hood, "The Consumer Comes to the Lumber Yard," *American Lumberman* (April 13, 1946), 228-237.
- ⁷¹ Ring Lardner, *Own Your Own Home* (Indianapolis, 1919); Eric Hodgins, *Mr. Blandings Builds His Dream House* (New York, 1946). Hodgins was on the editorial board of *Fortune*, which in April 1946 published a short story that became the book. The latter was made into a successful movie, released in 1948, starring Cary Grant and Myrna Loy.
- ⁷² Charles Abrams, "The Residential Construction Industry," in *The Structure of American Industry*, ed. Walter Adams (New York, 1950), 111-2.
- ⁷³ *Ibid.*, 108.
- ⁷⁴ Maisel, *Housebuilding in Transition*, 8. The first two views together correspond to the category of 'detractors' discussed below, while the third corresponds to 'critics.' Maisel did not explicitly position himself in relation to these three views.
- ⁷⁵ Henry Wright, "The Six-Cylinder House with Streamline Body," *Journal of the American Institute of Architects*, 14 (April 1926), 178; Lewis Mumford, "Mass Production and the Modern House," *Architectural Record* 67,1 (Jan. 1930), 17-18. This article, and a companion, were substantially reprinted in Mumford, *City Development* (New York, 1945), 63-83.
- ⁷⁶ Abrams, *Future of Housing*, 135.
- ⁷⁷ *Ibid.*, 140.
- ⁷⁸ Abrams, "Residential Construction Industry," 117.
- ⁷⁹ Arthur C. Holden, "New Methods of Construction in the Building Industry." Report of the Committee on Construction of the President's Conference on Home Building and Home Ownership, Appendix, Part (d), Washington, D.C., 3 Dec. 1931, 12 (Unpubl. typescript).
- ⁸⁰ U.S. Congress, Joint Committee on Housing, *High Cost of Housing*, 1.
- ⁸¹ U.S. National Commission on Urban Problems, *Building the American City*, 431.
- ⁸² W.C. Clark, *Housing*, Dalhousie University Bulletin on Public Affairs V (Halifax, 1938), 7.

⁸³ Ibid., 8, 9.

⁸⁴ R.I. Downing, "Housing and Public Policy," *Economic Record* 24 (1948), 76-77; Denis Winston, "The Problem," *Architecture in Australia* 51,2 (June 1962), 56-58.

⁸⁵ For discussion see Brian Finnimore, *Houses from the Factory. System Building and the Welfare State, 1942-74* (London, 1989), 60-61. Similar criticisms were made of the industry throughout western Europe. See, notably, United Nations. Economic Commission for Europe, *Proceedings of the Seminar on Changes in the Structure of the Building Industry Necessary to Improve its Efficiency and to Increase Its Output*. (New York, 1965), 3 vols.

⁸⁶ H.C.Badder, "British and American Building," *Building* (July 1926), 138-140.

⁸⁷ Great Britain. Ministry of Works. Mission to Study Building Methods in the United States, *Methods of Building in the U.S.A.* (London, 1944), 9, 12, 14.

⁸⁸ Great Britain. Anglo-American Council on Productivity. Building Productivity Team, *Building, Report of a Visit to the U.S.A. in 1949 of a Productivity Team Representing the Building Industry* (London, 1950), 63.

⁸⁹ Great Britain. Ministry of Works, "The Distribution of Building Materials in the United States and *The Distribution of Building Materials and Components* (London, 1948), 124, 129, 135. See also Great Britain. Ministry of Housing and Local Government, *Housebuilding in the USA. A Study of Rationalization and its Implications* (London, 1966).

⁹⁰ Australian Building Industry Productivity Team, *Report* (Melbourne, 1955), xiii.

⁹¹ C.A.Lembke, "Art Hood Succeeds at Broadbeach," *Australian Timber Journal and Building Products Merchandiser* 25,9 (Sept. 1959), 15, 17. See also Harris, "To Market! To Market!"

⁹² John Burchard, "Foreword" to Burnham Kelly, *The Prefabrication of Houses* (Cambridge, 1951), viii.

⁹³ A.C.Shire, "The Industrial Organization of Housing. Its Methods and Costs," in *Current Developments in Housing*, eds. David T. Rowlands and Coleman Woodbury, *Annals of the American Academy of Political and Social Science* 190 (March 1937), 37, 39.

⁹⁴ U.S. Temporary National Economic Committee, *Toward More Housing*, xvi, 127.

⁹⁵ Robert Lasch, *Breaking the Building Blockade* (Chicago, 1946).

⁹⁶ Editors of Fortune, "Industry Capitalism Forgot."

⁹⁷ U.S. Congress, Joint Committee on Housing, *High Cost of Housing*, 12.

⁹⁸ Abrams, *Future of Housing*, 369; Editors of Fortune, 1947, 66; Holden, "New Methods," 9; Lasch, *Building Blockade*; John P. Murchison, "Providing Homes for the People," *American Economic Review* XXII (1932), 441ff; Clarence Perry, *Housing for the Machine Age* (New York, 1939), 26-36; Shire, "Industrial Organization"; Alfred Sloan, "The Forward View," *Atlantic Monthly* 154,3 (Sept. 1934), 257-264; U.S. Federal Housing Administration, *Recent Developments in Dwelling Construction*. Technical Bulletin No.1 (Washington, D.C., 1936).

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- ⁹⁹ Walter Gropius, "Systematic Preparation for Rationalised Housing Construction," in *Bauhaus*, ed. Hans Wingler (Cambridge, 1975), pp.126-7 (orig. pub. 1927).
- ¹⁰⁰ Sloan, "Forward View."
- ¹⁰¹ For a sampling of media coverage see Alfred Bruce and Harold Sandbank, *A History of Prefabrication* (New York, 1944); Karl Detzer, "Houses off the Assembly Line," *Architectural Record* 37, 220 (August 1940), 77-80; Douglas Haskell, "Assembly Lines Reach Out For Markets," *Architectural Record* 93, 6 (June 1943), 62-69; O.W.McKennee, *Prefabs on Parade*, (New York, 1948); "A List of Prefabricators," *Architectural Record* 93,6 (June 1943), 75-79. United States F.H.A., *Recent Developments*; A.F.Bemis, *The Evolving House* (Cambridge, Mass., 1936); Burnham Kelly, *The Prefabrication of Houses* (Cambridge, 1951). For an early statement see Robert Tappan, "Factory Production Applied to the Housing Problem. In *Housing Problems in America. Proceedings of the Eighth National Conference on Housing*, ed. National Housing Association (New York, 1920), 56-64.
- ¹⁰² Haskell, "Assembly Lines."
- ¹⁰³ Abrams, *Future of Housing*, 366; "Residential Construction Industry," 138; Clark, *Housing*, 13. See also Downing, "Housing and Public Policy," 78-9; Henry Wright, "Housing Conditions in Relation to Scientific *Journal of the Franklin Institute* 218, 4 (1934), 489.
- ¹⁰⁴ Colean, *American Housing*, 5, 94, 130, 131, 171.
- ¹⁰⁵ *Ibid.*, 131.
- ¹⁰⁶ Colean and Newcomb, *Stabilizing Construction*, 1952, 109.
- ¹⁰⁷ *Ibid.*, 109-125.
- ¹⁰⁸ Canadian Welfare Council, *A National Housing Policy for Canada* (Ottawa, 1947), 14.
- ¹⁰⁹ Greig, *Dreams*, 66-7.
- ¹¹⁰ U.S. National Commission on Urban Problems, *Building the American City*, 481-5.
- ¹¹¹ There is a useful analytical discussion in Donald Bishop, "Productivity in the Construction Industry," in *Aspects of the Economics of Construction*, ed. D.A.Turin (London, 1975), 58-96. See also International Labour Office, *Housing Policy* (Montreal, 1945); H. Anderssen and J. McEvoy, *Instability in the Australian Residential Construction Industry*. Bureau of Industry Economics Research Paper No.10, Department of Industry, Technology and Commerce, Canberra, 1990; John Landis, "Why Homebuilders Don't Innovate," *Built Environment* 8,1 (1981), 46-53; Mark A. Willis, "The Effects of Cyclical Demand on Industry Structure and the Rate of Technological Change. An International Comparison of the Housebuilding Sectors in the United States, Great Britain and France." Unpubl. PhD., Yale University.
- ¹¹² Catherine Bauer, "Housing in the United States. Problems and Policy," *International Labour Review* 52,1 (July 1945), 1-28; Canadian Welfare Council, *A National Housing Policy*.
- ¹¹³ Miles Colean, *Organizing the Construction Industry for Mass Markets* (Washington, D.C, 1949), 4-5; Colean, *American Housing*, 329; TIME and Architectural Forum, *Home Building*, 10.

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- ¹¹⁴ Colean, *Organizing the Construction Industry*.
- ¹¹⁵ Grebler, *Production of New Housing*. The membership of the Committee included Ernest Fisher, Richard Ratcliff and Coleman Woodbury, and the project received early guidance from Miles Colean.
- ¹¹⁶ *Ibid.*, 55, 58, 69, 82-85.
- ¹¹⁷ Maisel, *Housebuilding in Transition*, 3, 288.
- ¹¹⁸ *Ibid.*, 58-59, 231
- ¹¹⁹ *Ibid.*, 56-7, 254. Cf. Grebler, *Production of New Housing*, 65-69.
- ¹²⁰ Maisel, *Housebuilding in Transition*, 55, 65, 176, 209. Cf. Grebler, *Production of New Housing*, 82-85.
- ¹²¹ Maisel, *Housebuilding in Transition*, 217.
- ¹²² *Ibid.*, 31, 299.
- ¹²³ Herzog, "Structural Changes;" Boyd, "The Development of Modern Methods," 23; Hutton, *Building and Construction in Australia*, 81-3, 94-5; Walsh, *Housebuilding Industry*, 58-61.
- ¹²⁴ U.S. Bureau of Labor Statistics, *Cost Savings through Standardization, Simplification, Specialization in the Building Industry* (Washington, D.C., 1952), 83-113. Cf. Walsh, *Housebuilding Industry*, 31-4.
- ¹²⁵ William Haber and Harold M. Levinson, *Labor Relations and Productivity in the Building Trades* (Ann Arbor, 1956). Cf. William Haber, *Industrial Relations in the Building Industry* (Cambridge, Mass., 1930).
- ¹²⁶ *Ibid.*, 20-2, 249.
- ¹²⁷ *Ibid.*, 20.
- ¹²⁸ In 1948 Art Hood added *and Building Products Merchandiser* to the masthead of his journal. Con Lembke made a similar change to *The Australian Timber Journal* a decade later. These additions reflect the diversification of retail lumber dealers in the postwar period.
- ¹²⁹ This statement, and our discussion of the trade journals, draws upon a comprehensive reading of the building supply journals named in the previous paragraph from the 1920s to the mid-1950s, a selective reading of *American Builder* and a complete survey of *Canadian Builder* from its birth in 1952.
- ¹³⁰ "So Capitalism Forgot Us!" *Building Supply News* 73,3 (Sept. 1947), 187 [editorial].
- ¹³¹ Sidney Gertler, "Prefabricated Wood Dwellings," *Construction Review* 5,6 (1959), 11-12. Some of these companies may themselves have been dealers, but this is an area in which it is impossible to obtain precise and reliable data.
- ¹³² National Retail Lumber Dealers Association, *Here's a Better Way to Build* (Washington, D.C., 1947), 6.
- ¹³³ Fred H. Ludwig, "The Efficiency of the Small Builder." In *Proceedings of the National Conference on Post-war Housing*, ed. National Committee on Housing, Inc. (New York, 1944), 169-6.
- ¹³⁴ David D. Bohannon, "Overhead in Large vs. Small Operations," *Tomorrow's Town* 3,9 (1946), 4.
- ¹³⁵ "Big Builder Bohannon Tells How Small Builders Can Compete in the Post-war," *American Builder* 67,2 (Feb.1925), 78-81; "Big Dave Bohannon," *Fortune* XXXIII, 4 (April 1946), 199.
- ¹³⁶ Kelly, *Prefabrication of Houses*, 95.

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- ¹³⁷ Kelly, *Design and the Production of Houses*, 348.
- ¹³⁸ Nelkin, *Politics of Housing Innovation*.
- ¹³⁹ National Commission on Urban Problems, *Building the American City*, 438-40.
- ¹⁴⁰ Quoted in W.D. Keating, *Emerging Patterns of Corporate Entry Into Housing*, Center for Real Estate and Urban Economics, Institute of Urban and Regional Development, University of California, Berkeley, 1973, 2.
- ¹⁴¹ For a critical assessment of Operation Breakthrough see Robert J. McCutcheon, "The Role of Industrialized Building in Low Income Housing Policy in the United States of America," *Habitat International* 14,1 (1990), 161-76.
- ¹⁴² Nelkin, *Politics of Housing Innovation*, 97-100.
- ¹⁴³ Keating, *Emerging Patterns*, 2, 28.
- ¹⁴⁴ Rosalyn Baxandall and Elizabeth Ewen, *Picture Windows. How the Suburbs Happened* (New York, 2000), 39; Wright, "Six-Cylinder House;" Davison, "New Construction Methods," 363.
- ¹⁴⁵ Murchison, "Providing Homes," 443.
- ¹⁴⁶ Alfred Kastner, "The Architect's Place in Current Housing." In *Housing Yearbook*, ed. Coleman Woodbury (Chicago, 1938), 229-30.
- ¹⁴⁷ Nelkin, *Politics of Housing Innovation*, 4.
- ¹⁴⁸ Baxandall and Ewen, *Picture Windows*, 122, 133, 139.
- ¹⁴⁹ See, for example, Randall's use of *Fortune* to justify a claim about the importance of industry scale, and Mohl's passing suggestion that Levittown "typified" the post-war suburban boom. Gregory C Randall, *America's Original G.I. Town. Park Forest, Illinois* (Baltimore, 2000), 158-9; Raymond A. Mohl, "Shifting Patterns of American Urban Policy since 1900." In *Urban Policy in Twentieth-Century America* (New Brunswick, 1993).
- ¹⁵⁰ Francis T. Ventre, "On the Blackness of Kettles. Inter-Industry Comparisons in Rates of Technological Innovation," *Policy Sciences* 11,3 (1980), 309-328; Ronald Denowitz, "Industries and Environments. A Comparative Study of Housebuilding in Two Suburban Areas," Unpubl. PhD, University of Chicago, 1982. See, also, the papers in Julian E. Lange and D.Q. Mills, *The Construction Industry. Balance Wheel of the Economy* (Lexington, Mass., 1979).
- ¹⁵¹ Michael Ball, "The International Restructuring of Housing Provision." In *Housing and Social Change in Europe and the U.S.A.* eds. Michael Ball, Michael Harloe and Maartje Martens (New York, 1988); Ball, *Construction Rebuilt*, 32; A. Tuckman, "Looking Backwards. Historical Specificity and the Labour Process" *Production of the Built Environment* 2 (198), 59. See also James Barlow, "From Craft Production to Mass Customisation. Innovation Requirements for the U.K. Housebuilding Industry," *Housing Studies* 14,1 (1999), 23-42; Greig, *Dreams*.
- ¹⁵² David Gann, *Flexibility and Choice in Housing* (Bristol, 1999), 12. Gann attributes the argument that "it is important not to regard housing production as a failed manufacturing process" to the late Steven Groák.

See Steven Groak, *The Idea of Building* (London, 1993).

¹⁵³ Jerry Patchell, "Linking Production and Consumption. The Coevolution of Interaction Systems in the
Annals of the Association of American Geographers 92,2 (2002): 284-301.

¹⁵⁴ <http://cic.vtt.fi/lean/>

¹⁵⁵ Richard R. John, "Elaborations, Revisions, Dissents. Alfred D. Chandler, Jr's, *The Visible Hand* after
Twenty Years," *Business History Review* 71,2 (1997), 151-200.

¹⁵⁶ Scranton, *Proprietary Capitalism*, 4.

¹⁵⁷ Philip Scranton, "Manufacturing Diversity. Production Systems, Markets, and an American Consumer
Society, 1870-1930," *Technology and Culture* 35 (1994), 476-505.

¹⁵⁸ M.Naim, J.Naylor and J.Barlow, "Developing Lean and Agile Supply Chains in the U.K. Housebuilding
Industry," Paper presented at the International Group for Lean Construction Conference, Berkeley, CA, July
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¹⁵⁹ Roy Church, "New Perspectives on the History of Products, Firms, Marketing, and Consumers in Britain
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also Patchell, "Linking Production and Consumption"; Gann, "Flexibility and Choice."

¹⁶⁰ Colean, *American Housing*, 38-58; Colean and Newcomb, *Stabilizing Construction*, 22-35; Grebler,
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¹⁶¹ Charles Sabel and Jonathan Zeitlin, "Historical Alternatives to Mass Production. Politics, Markets and
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