Labor Market Segmentation: Positive Feedback and Divergent Development

By Thomas Vietorisz and Bennett Harrison*

There are good jobs and there are bad jobs. This is such a commonplace fact of life that it often goes unquestioned, even by specialists in the economics of labor and poverty. Studies of labor market segmentation appear from this point of view to make unnecessarily much of a simple consequence of the uneven distribution of talent and effort.

Yet when bad jobs are found to be so widespread that perhaps 60 percent of workers in the inner city fail to earn enough to support a family at even minimum levels of decency, conventional explanations based on individual differences in labor productivity become incredible (W. Spring, B. Harrison, and T. Vietorisz). These facts of life point to institutionalized labor market conditions that call for detailed analysis in their own right.

A number of institutional and econometric studies have measured and analyzed the existence and dimensions of labor market segmentation. (See B. Bluestone, 1970; P. B. Doeringer and M. J. Piore; D. M. Gordon, 1971 and 1972; B. Harrison, 1972a, especially ch. 5; Harrison, 1972b; Piore, 1972; and H. M. Wachtel and C. Betsey.) These studies find that the labor market in the United States is divided into discrete segments across which mobility is severely restricted by technological and social barriers. Research is now under way to refine our measures of the extent and the parameters of this intersectoral immobility.

The primary labor market functions more or less in keeping with public perceptions of work and its rewards and is characterized by high wages, high productivity, high stability, and high rates of technical progress. Not so the secondary labor market; here a vicious circle keeps wages, productivity, and stability to catastrophically low levels and brings about technological stagnation. The welfare system is an integral part of this vicious circle. On the one hand, it acts as a payroll subsidy to secondary employers; on the other hand, it maintains living levels low enough to force a steady flow of labor supply into the secondary labor market.

The previously cited studies of labor market segmentation indicate that far more is involved in these phenomena than just a smoothly graduated transition between "good jobs" and "bad jobs." Labor market segmentation has a logic of its own that requires a theory to answer three specific sets of questions:

(1) What explains the existence of labor market segmentation? What mechanisms bring it about within the prevailing institutions?

(2) What processes select and stabilize the institutions which lead to segmentation? What functions does segmentation perform within the prevailing social organization of production, and how are these functions changing over time?

(3) What ensures the coherence of the labor market as a system-defining institution of a modern industrial market economy in the face of strong tendencies toward segmentation?

* The New School for Social Research and Massachusetts Institute of Technology, respectively.
The present paper is principally addressed to the first set of questions. A brief sketch of our treatment of the others—to be published in detail elsewhere—will conclude the presentation.

I. A Feedback Model of the Labor Market

In standard economics the existence of segmentation, where it has been recognized at all, has been treated superficially. The concept of noncompeting groups is not new, but its treatment in the literature is patently unsatisfactory by virtue of the absence of an explanation of why non-competing groups form and are sustained. Barbara Bergmann’s “crowding hypothesis” examines the neoclassical implications of a caste-like organization of occupations, but the existence of the castes (“black jobs and white jobs, male jobs and female jobs”) remains a black box. In the most interesting of several discrimination models by K. J. Arrow, employers’ assumed preferences are such as to lead to all-black or all-white work places. This nonconvexity sustains racial disparities in income and employment. But the preferences that gave rise to this failure of convexity are not explained. They are, as usual, exogenous to the model.

There can be no theory of labor market segmentation as an endogenous phenomenon within the economic system so long as the theory remains committed to the neoclassical paradigm, because labor market segmentation is an instance of divergent development rather than of convergence to equilibrium. Orthodox analysis cannot begin to account for divergent development without invoking such a long list of qualifications and special assumptions that it loses all of its coherence. Rather than attempting to graft alien shoots onto the neoclassical paradigm, it is preferable to formulate the problem from the start in terms of an alternative set of conceptions.

A. Basic Conceptions of the Analysis

In order to demonstrate that the tendency toward labor market segmentation is inherent in the core institutions of a modern market economy, we shall employ a number of nonstandard conceptions about the economic system:

1. In some key subsystems, positive rather than negative feedback dominates (Myrdal, Vietorisz);
2. Mechanization and automation are instances of irreversible change in the social organization of the process of production, rather than marginal adjustments along the capital-labor isoquants of a changeless production function (Georgescu-Roegen);
3. The level of real wages is set by the money-wage bargain and the degree of oligopoly in commodity markets; the labor market does not “clear” at marginally determined real wage levels (Nell).

B. Feedback and the Standard Model of the Labor Market

Feedback is a closed cycle of causation in complex systems whose parts are dynamically interrelated. Neoclassical economic models contain many examples of feedback; the interaction of wage levels and production techniques will serve as an illustration.

If wage levels temporarily differ in two activities A and B (e.g., as the result of some random disturbance), the feedback cycle illustrated in Figure 1 will tend to narrow or eliminate the difference. Where wages are high (activity A), the substitution of capital for labor will reduce the demand for labor and wages will tend to diminish. Where wages are initially low, the opposite result will occur. In both cases, the induced price movement—after completion of the cycle—counteracts the original price deviation. This is called negative feedback, since the original change and the induced change have opposite
Figure 1. Production technique cycle (negative feedback):

**Activity A**
1. high wages  
2. adoption of capital-intensive techniques  
3. reduced labor demand  
4. wages diminish

**Activity B**
1. low wages  
2. adoption of labor-intensive techniques  
3. increased labor demand  
4. wages increase

Figure 2. Production technique cycle (positive feedback):

**Activity A**
1. high wages  
2. adoption of labor-saving innovations  
3. higher productivity  
4. wages increase

**Activity B**
1. low wages  
2. persistence of more labor-intensive techniques  
3. low productivity  
4. wages stagnate

Figure 3. Mobility cycle:
(negative feedback)

1. more workers seeking jobs;  
2. labor flows from B to A  
3. higher reservation wages  
4. wages diminish

Figure 4. Skill cycle:
(positive feedback)

1. high wages  
2. adoption of labor-saving innovations; investment in higher skills  
3. higher productivity  
4. wages increase

Figure 5. Reservation wage cycle
(positive feedback)

1. high wages  
2. acquired level of skills  
3. reduced labor demand  
4. wages decrease

Figure 6. Skill cycle
(negative feedback)

1. high wages  
2. adoption of labor-saving innovations; investment in higher skills  
3. higher reservation wages  
4. wages diminish
signs. Negative feedback will tend to re-
store equilibrium unless the feedback is 
either too weak or so strong that it badly 
overshoots in the opposite direction (like 
a bad driver oversteering in a skid). In the 
present model, the negative feedback 
tends to keep labor prices uniform in the 
two activities.

The stability of equilibrium in neoclas-
sical market models turns on negative 
feedback. It is therefore not surprising 
that such models are invariably built on 
assumptions that bring about negative 
feedback, with no more than local excep-
tions or aberrations (e.g., the “unstable 
equilibrium” of intermediate microeco-
nomics, neatly sandwiched in between 
two stable equilibrium points).

Negative feedback in the standard 
model of the labor market is guaranteed 
by two assumptions. (1) Marginal sub-
stitution along the capital-labor isoquants 
in response to rising wages increases the 
marginal productivity of labor just enough 
to offset the higher wage level. The higher 
productivity of labor leaves no surplus 
(supranormal profit) because the labor-
saving substitution along the isoquant re-
quires increased use of capital which must 
be paid the value of its marginal product. 
The entrepreneur’s excess profit remains 
zero, leaving no room for labor to bargain 
for increased wages. (2) The economy is 
static. There is no way for labor released 
by labor-saving substitutions in one part 
of the economy to be reemployed in another part at the newly established, 
higher marginal productivity and wages. 
The marginally derived, static labor de-
mand function will fail to clear the labor 
market until wages fall back to their 
equilibrium level and the labor-saving 
substitution along the isoquant is re-
versed.

C. Segmentation and Positive Feedback

When we replace these neoclassical as-
sumptions by a more realistic way of look-
ing at the labor market, negative feedback 
is no longer inevitable. Such processes can 
still be present, but, where concentration 
and segmentation occur, they are over-
powered by strong positive feedback.

Positive feedback arises when the in-
duced effect—after completion of the cycle—has the same sign as the original 
effect and thus reinforces it. Figure 2 gives 
a reinterpretation of the production tech-
nique cycle based on our fundamental conceptions of the nature of the labor 
market. Causation from (1) to (2) is un-
changed. But the effect of the choice of 
technique is now very different. In ac-
tivity A, productivity increases as a result 
of mechanization and automation. This 
might be described in neoclassical terms 
as factor substitution along the capital-
labor isoquants of a fixed production func-
tion combined with an inward shift of the 
entire isoquant map, i.e., a capital-em-
bodied technical change. Yet the mech-
anism is grounded in dynamic considera-
tions, not in a comparative-static view of 
the world. When the need to shift to a 
more mechanized or automated technol-
ology becomes pressing for an entrepreneur, 
he will exchange his existing productive 
structure—some years out-of-date—for 
one that is not only less labor-intensive 
but also more up-to-date. The basic con-
ception is that the adjustment of the 
productive structure occurs in jolts rather 
than continuously. Once an adjustment 
takes place at all, it will be carried to the 
point of best practice technology and then 
becomes an irreversible historical change.

Moreover, in industries with rising wage 
levels the entrepreneur will be motivated 
to invest in research and development in 
anticipation of the need for labor-saving 
innovations and, therefore, the leading 
edge of technological change will advance 
more rapidly than in industries with stag-
nant wage levels. Our argument here par-
allels Schumpeter's temporary-monopoly argument, except that we see the reason for innovation not only in the carrot of higher profits but also in the stick of rising wages. In neoclassical terminology we assert that both actual and anticipated factor substitution will trigger innovation. Such a conception contributes to the undermining of the very notion of a static production function with reversible factor substitution.

By contrast, in the low-wage activity B, labor-intensive techniques are appropriate. Labor-saving innovations (embodying new productivity-enhancing techniques) are not sought out or adopted. The low-wage activity thus remains technologically stagnant and labor productivity fails to increase.

Causation from (3) to (4) closes the cycle via the money-wage bargain which will greatly favor workers in the more productive industry. Productivity increases brought about by technological innovations in oligopolistic industries enhance the profitability of firms. These Schumpeterian temporary-monopoly profits are subsequently eroded in two ways, both of which improve real wages. First, in keeping with Schumpeter's argument, innovations will diffuse and price structures favoring the innovator will therefore tend to weaken. This improves real wages from the side of the price level, since at given money wages the real wage is determined by the pricing of the commodities in labor's market basket. Second, temporary-monopoly profits are eroded by the continual wage pressure of labor upon the firm, both at the micro level of the work place and at the macro level of social and political institutions (such as the lobbying process in the federal legislature and the executive office of the President). The money-wage bargain amounts to splitting the increased surplus of the firm between capital and labor. The money-wage level reflects both the total increase in surplus available for being split and the relative bargaining position of labor.

In sum, activities A and B will undergo divergent development. Technological levels, labor productivity, and wages will steadily advance in activity A while they will stagnate in activity B. The cluster of activities of type A will define the primary labor market and that of type B, the secondary labor market. The mechanism of positive feedback thus underlies divergent development and labor market segmentation.

D. The Presence of Negative Feedback

In any real labor market, positive and negative feedback cycles always operate side by side, with their relative strengths determining where the outcome will tend toward homogeneity and where toward segmentation. Myrdal has termed these antithetic forces "spread" (negative) and "backwash" (positive) effects.

The most important spread effects are caused by the dependence of the money-wage bargain on the number of workers seeking jobs, in relation to entrepreneurs' hiring rates. This is the aspect of the money-wage bargain which is captured by the neoclassical demand-supply cross; but in making use of this aspect we of course do not commit ourselves to the static character and unrealistic marginality assumptions of neoclassical analysis. For simplicity, we shall hereafter freely use the terms "demand" and "supply" but we shall interpret them in this generalized sense.

One effect of labor-saving innovations on activity A is to reduce entrepreneurs' hiring rates (labor demand) and to depress the money-wage bargain, while one effect of labor-intensive technologies in activity B is to sustain entrepreneurs' hiring rates and support the money-wage bargain. This aspect of the negative feedback cycle
is captured by the neoclassical model we have already presented in Figure 1. But note that the strength of the cycle hinges on dynamic rather than static considerations. In particular, workers displaced by labor-saving innovations will be reabsorbed at a rate that depends on the rate of growth of the advanced sector. If this reabsorption rate is high enough, it could actually lead to a labor shortage, not a surplus, thereby eliminating the spread effect. If the reabsorption rate is low, the excess labor may indeed depress the money-wage bargain, but labor might just as well strike a hard bargain even in the face of considerable unemployment. Strong unionization, typical of segment A, favors the second outcome and weakens the spread effect even when the growth of the advanced sector is relatively slow.

In segment B, the spread effect becomes ineffective in raising wages, in spite of employers’ sustained hiring rates, when large numbers of workers are standing ready to be employed at the going wage rate. From Marx’s “reserve army of the unemployed” to the “surplus labor” of economic development theory, this condition has always been taken as characteristic of urban and rural underemployment. In the American context, this chronic labor surplus in low-wage labor markets is partly determined by the particular nature of alternative sources of income—especially public welfare. Substandard support levels (or the high risk associated with illegal earnings) force individuals to seek low-wage work, thus guaranteeing the high elasticity of supply which prevents wages from rising even when demand increases.

E. Mobility: Divergence Versus Cohesion

The ineffectiveness of the spread effects combines with the operation of the positive feedback to contribute to the observed outcome: backwash effects dominate spread effects, thus giving rise to divergent development.

Yet a moment’s thought will reveal that uniformly dominant positive feedback alone cannot explain segmentation. Divergence—yes; but what if every activity were to diverge from every other activity like galaxies receding from each other in space? Segmentation implies internal cohesion within the segments as much as divergence between them. Locally dominant spread effects are responsible for this cohesion. Moreover, there are limits on the divergence of the system as a whole (these will be analyzed in Part III).

The most important of the locally dominant spread effects is mobility. Mobility is a response to the outcome of the wage bargain in different activities, and causes labor flow from low-wage to high-wage activities. This in turn influences the outcome of the wage bargain by tending to eliminate any wage differential. (See Figure 3 for Activity A; for Activity B, the cycle runs in reverse.) Within labor market segments mobility is high and therefore wages tend to converge. Between labor market segments, mobility is low and the backwash effects become dominant.

Low mobility can occur as a result of geographical distance with positive relocation costs; then the result is the progressive divergence of wage levels between advanced and backward areas. It can occur as a result of discrimination by race or sex. It can also occur as a result of sociological barriers, as between crafts or public functions traditionally controlled by particular ethnic groups. But if we simply postulate the existence of such barriers to mobility, then we have failed to show that segmentation is indeed an endogenous phenomenon in a market economy. In order to show that low mobility from B to A type activities will tend to develop even within an initially (spatially
or sociologically homogeneous labor force, we must invoke another cycle of causation, involving education and training.

II. The Endogenous Origin of Barriers to Mobility

A. Technology and Skills

Major differences in education, work norms, and job-oriented training, to be referred to hereafter simply as "skills," arise as a result of positive feedback in the labor market (Piore, 1973). These differences in turn become effective barriers to mobility which sustain the divergent development of labor market segments.

Figures 4 and 5 show the positive feedback cycles underlying these endogenous barriers. In each case, only the advancing activity A is shown. For activity B, the cycle runs in reverse, leaving wages, skills, and productivity stagnant.

Our basic conception is that labor-saving technological innovations substitute both capital goods and higher skills for less skilled labor. The capital goods of the more advanced technology are complementary with the more skilled labor, and therefore a higher average skill level of the labor force is both a requirement for the adoption of labor-saving innovations and a consequence of the technical advance these innovations represent.

Figure 4 is an elaboration of the cycle which was illustrated earlier in Figure 2. The consequence of labor-saving innovations and a higher average skill level of the labor force is both a requirement for the adoption of labor-saving innovations and a consequence of the technical advance these innovations represent.

To be sure, this "asking wage" may fall over time in response to continued unemployment, as posited by the "search theorists" (C. Holt et al.). Moreover, it is to some extent related to the level and

barriers to mobility arise. No matter what the skills are or where they come from, their effect—as part of the social organization of the process of production at a higher technological level—is to strengthen the hand of labor in the money-wage bargain. The average level of wages in activity A will therefore rise.

The higher wages, in turn, will both motivate and finance self-investment in skills by the workers. These skills will be in demand because employers will wish to adopt further labor-saving innovations. Moreover, employers will themselves be motivated to invest in both the general and specific skills of their workers as part of the technological upgrading process. The resulting rise in productivity keeps the cycle going.

In activity B, by contrast, wages are low, labor-saving innovations are absent, and there is no need or any use for higher skills. Self-investment in higher skills by the workers is therefore neither motivated nor financed. Employer investment in specific or general skills of the work force is held to the minimum made necessary by labor turnover under the existing technology. Therefore wages, skills, technology, and productivity all tend to stagnate.

B. Reservation Wages

Figure 5 presents an aspect of this process emphasized by Bluestone (1970) and Wachtel and Betsey. Given the widely held expectation that self-investment in education and skills entitles one to higher income and social status, the act itself will induce workers to raise their "reservation wages," i.e., the level of wage for their particular skill class beneath which they are unwilling to offer any labor at all.
availability of other forms of income; illegal earnings or public assistance reinforce high reservation wages (Harrison, 1972a, ch. 5). In any event, the workers' aspiration level and militancy increase and tend to improve the wage bargain.

Such self-investment in higher skills—including investment in the education and training of one's children—is possible only from wages paid by type A activities. Type B activities leave no margin for self-investment, which further contributes to the stagnation of these activities.

C. Negative Feedback and Skills

The spread effects, operating side by side with the backwash effects which have been discussed earlier, can now be elaborated from the point of view of skills. Figure 6 presents an expanded and more detailed version of the negative feedback cycle. The cycle opposes the divergent movement of average skill and wage levels between activities A and B. It originates in labor displacement by labor saving innovations and translates the reduced labor demand in activity A into a deterioration of the wage bargain. Step 4 of the cycle thus represents a diminished wage level for a labor force with higher than average skills in activity A. This in turn will reduce both the means and the motivation for worker self-investment in skills, and the upward surge of activity A is dampened. Activity B, where no labor saving innovations have taken place, furnishes the reference level for wages and skills.

Note that the spread effect does not require symmetry between activity A and B. Since technological improvement is irreversible, we do not postulate that activity B will regress under the influence of low wages, going back to more labor-intensive techniques, but merely that it will remain stagnant.

This asymmetry has important implications for the pattern of economic growth. Negative feedback is not capable of pulling up a stagnant activity to the level of more dynamic activities since merely sustaining the labor demand for archaic, low-skill technologies is far too weak an effect to accomplish such a result. On the other hand, negative feedback can retard or forestall the advance of potentially dynamic activities.

Which activities will, therefore, become type A (primary) and which type B (secondary)? Some activities have inherently high-skill requirements while others can be undertaken at low-average-skill levels, even though they might also be susceptible to technological and skill upgrading. In nineteenth century England, cotton textile manufacture worked with low skills, low wages, and was technologically stagnant compared to its higher wage, higher skilled, American counterpart. Yet machine building, requiring inherently higher skilled mechanics, paid better wages from the start and was a technologically progressive industry. The activity inherently requiring higher skills will therefore become primary, but random shocks can also start an initially low-wage, low-skill activity on a dynamic upward path.

D. Skills and Mobility

We are now ready to close the argument on the endogenous generation of barriers to mobility via skills.

High mobility gives rise to a spread effect strong enough to wipe out the positive feedback cycle leading to divergent development. Mobility between type A and type B activities, as shown in Figure 3, can operate across minor skill barriers. But mobility across major skill barriers will tend to be far more restricted.

This conception can be readily quantified and is subject to statistical verification. We assert that mobility, as measured by the flow of workers between a pair of type A and type B activities, will syste-
matically decrease with greater difference in average skill levels between the two activities. Since we will later argue that skill barriers are subject to secondary reinforcement by race, class, and sex discrimination (and are often protected by the practice of "credentialism"), we cannot expect the statistical test to prove the causality postulated in our model, but it can at least establish its consistency with the facts.

Note that our argument does not imply its converse. High barriers can exist without skill differences. A group of workers might be able to strike a tough wage bargain and then successfully fight off outsiders attracted by the higher wage level. Yet once this situation persists, it is likely to bring about the cumulative upward surge of technology and skills characteristic of the positive feedback cycle.

In sum, the higher the wage and skill levels of an activity rise as a result of purely random deviations from the norm (or as a result of social mechanisms such as racism and sexism), the lower mobility will become between this activity and other lower skill, lower wage activities. This lower mobility will in turn protect the higher wage and skill levels, and will increase the probability of the positive feedback cycle overcoming residual mobility and other spread effects.

E. The Question of Individual Wage Differentials

Individual wage differentials—a major concern of human capital theory—are by no means ruled out by our model. Secondary wage differentials between individuals, based on education and skill gradings, can and do occur within activities and within labor market segments. Yet we regard the general wage level of large groups of workers as the core phenomenon in a modern industrial market society and individual differentials within these groups as a matter of secondary institutional elaboration.

This point of view is supported by the empirical finding that in the lower occupational strata, group characteristics (class, race, sex) dominate the determination of wage levels, while individual characteristics (education, skills) become more dominant only in the numerically far less important upper occupational strata (Bluestone, 1971). We have therefore begun by interpreting the core phenomenon.

Yet secondary institutions are also important because they serve to secure and protect the core institutions. Human capital theory provides us with the important insight that the prevailing institutions encourage workers to think of the education and skills they acquire as capital investments in themselves. Since the capitalist is worthy of his profit, workers come to view themselves implicitly as mini-capitalists who are entitled to the profit on their investment in the form of higher wages than other workers. This legitimates the core institution of profit while dividing the workers among themselves and weakening their hand in the wage bargain.

III. Conclusion

In the present paper, which is the first part of a three-part study, we have interpreted segmentation as a process of divergent development. This process can be explained by positive feedback that connects technical change, labor productivity, and the money-wage bargain in the labor market. The emerging segments are prevented from coalescing by low mobility between them. Low mobility is endogenous to the system and results from divergent education, training, and skills associated with distinct labor market segments. Thus the mobility barriers are themselves maintained by positive feedback. Forces of negative feedback are present but are too weak to prevent segmentation.
A. The Institutionalization of Divergence

The dominance of positive feedback and the resulting tendencies for divergent development are inherent in the core institutions of a modern market society. In Part II of the study we show that these tendencies are further reinforced by clusters of secondary institutions which arise because segmentation is functional to the system. It forms part of a multilayered web of social control that protects the prevailing organization of the process of production. Production is organized by the profit motive. Segmentation protects profits against the wage pressure of workers, both at the work place and at the social and political level, on the principle of divide and rule. This mode of control, however, leads to exploitation and social conflict which govern the long-term tendencies for change within the system.

B. The Coherence of Segmented Labor Markets

In the day-to-day operation of the labor market, divergent development acts as the counterpoint to the coherence of individual market segments. In the third part of the study we focus on the integrative processes that bring about this coherence. Within individual labor market segments—but not between them—mobility is high and wages tend toward uniformity or regular secondary differentials. The individual segments themselves form a coherent overall market for labor power. Integration both within and between market segments is provided by the process and institutional setting of the wage bargain. The wage bargain depends on parameters that define a buyers' market or a sellers' market in labor of a given type. These parameters make up a complex signaling system which regulates the behavior of each market segment, interconnects different segments, and ties the labor market as a whole into broader social and political decisions.

In sum, we perceive segmented labor markets not as an aberration within an otherwise harmonious economic and social system, but as at least one of the normal modes of operation of a modern industrial market society. The real labor market as we find it is the outcome of tendencies for differentiation operating simultaneously with tendencies for integration. The outcome of these antithetical tendencies is strongly influenced by the way the labor market as a subsystem is linked into the institutions and processes of its broader economic and social environment. Yet tendencies for change in the broader economic and social system are brought about in part by the very conflicts inherent in the day-to-day operation of segmented labor markets.

REFERENCES

———, Theories of Poverty and Underemployment, Lexington 1972.


