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Derek Hum et Paul Phillips

Résumé de l'article

Certains thèmes des études historiques et contemporaines de l'évolution économique du Canada gardent leur importance, notamment la démarche consistant à interpréter en fonctions des denrées de base l'évolution de l'économie canadienne, celle qui voit le Canada comme une collection d'économies régionales et la distinction entre métropole et arrière-pays. Ces thèmes sont à la fois fondamentaux et reliés entre eux; en vérité, ils constituent des manifestations d'un processus commun — celui d'une expansion économique dépendant des ressources. Cette communication relie l'urbanisation et l'expansion des régions dont l'économie repose sur les denrées de base à certains facteurs comme les échanges, la croissance et la structure économique. Nous intégrons l'opposition métropole-arrière-pays dans le cadre plus vaste des denrées essentielles, pour réaliser une synthèse des divers aspects de la théorie économique, surtout la structure des échanges et de l'économie, la croissance, grâce aux exportations, d'une petite économie ouverte et le dynamisme fondé sur le déséquilibre de l'expansion urbaine — tout cela réinterprété dans le cadre spécial de l'économie des denrées de base. Bien que nous gardions pour but principal de fournir une synthèse formelle de la démarche fondée sur les denrées essentielles et de l'expansion urbaine, afin d'en orienter la politique, nous nous reportons tout au long de l'exposé à l'évolution économique et historique du Canada.
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Résumé/Abstract

Certains thèmes des études historiques et contemporaines de l'évolution économique du Canada gardent leur importance, notamment la démarche consistant à interpréter en fonction des denrées de base l'évolution de l'économie canadienne, celle qui voit le Canada comme une collection d'économies régionales et la distinction entre métropole et arrière-pays. Ces thèmes sont à la fois fondamentaux et reliés entre eux; en vérité, ils constituent des manifestations d'un processus commun — celui d'une expansion économique dépendant des ressources. Cette communication relie l'urbanisation et l'expansion des régions dont l'économie repose sur les denrées de base à certains facteurs comme les échanges, la croissance et la structure économique. Nous intégrons l'opposition métropole-arrière-pays dans le cadre plus vaste des denrées essentielles, pour réaliser une synthèse des divers aspects de la théorie économique, surtout la structure des échanges et de l'économie, la croissance, grâce aux exportations, d'une petite économie ouverte et le dynamisme fondé sur le déséquilibre de l'expansion urbaine — tout cela réinterprété dans le cadre spécial de l'économie des denrées de base. Bien que nous gardions pour but principal de fournir une synthèse formelle de la démarche fondée sur les denrées essentielles et de l'expansion urbaine, afin d'en orienter la politique, nous nous reportons tout au long de l'exposé à l'évolution économique et historique du Canada.

Certain themes in historical and contemporary studies of the economic development of Canada remain important. Among these are the staple approach to interpreting Canadian economic development, the notion of Canada as a collection of regional economies, and the distinction between metropolis and hinterland. These themes are both fundamental and interrelated; indeed, they are manifestations of a common process — that of a resource-dependent economic expansion. This paper relates the urbanization and development of staple regions to such determinants as trade, growth, and economic structure. We integrate the metropolis-hinterland framework within the broader staple approach and provide a synthesis of various aspects of economic theory, particularly trade and economic structure, export-led growth of a small, open economy, and the disequilibrium dynamics of urban development — all reinterpreted within the special context of the staple economy. While our major aim is to provide a formal synthesis of the staple approach and urban development, ultimately for policy guidance, references to Canadian economic and historical development are made throughout.

Introduction

Certain pervasive themes in studies of the economic development of Canada remain important for analyzing contemporary economic problems. By far the most important of these is the staple approach which, though subject to a wide variety of interpretations, still dominates in historical studies of the Canadian economy — despite some attempts to question its applicability to Canadian economic growth past the mid-nineteenth century. A second major theme is regionalism, a conception of Canada as a collection of several economies rather than a single national unit, held together by sentiment, fear, deliberate policy, and archaic symbols in defiance of geography, climate, and natural market forces. A related third theme is that of metropolis-hinterland, a hierarchical conception of economic functions distinguished by industrial activity (manufacturing or staple production) or location (urban centre or periphery), or both.

* We would like to thank A.F.J. Artibise and A.M.C. Waterman for their helpful comments on an earlier draft of this paper. Any errors remaining are the responsibility of the authors.

Urban History Review/Revue d'histoire urbaine, Vol. X No. 2
(Oct./oct., 1981)
such determinants as growth, trade, and economic structure. This attempt to integrate the metropolis-hinterland framework within the broader staple approach involves a synthesis of various aspects of economic theory, particularly those relating to: (a) growth and trade and their impact on economic structure, (b) the regional export-base literature, (c) neoclassic growth theory in a "small, open" economy, and (d) certain propositions concerning the disequilibrium dynamics of "urban development," all reinterpreted within the special context of the staples-economy.

The structure of the paper is as follows. Section I provides a formal characterization of a staples regional economy. Since the Canadian historical and economic literature abounds with numerous descriptions of what constitutes a staple approach, formal specification provides an analytic framework whereby assumptions can be stated explicitly and implications explored in the form of definite propositions. Further, formal characterization of a staples region is not common; hence, it is both useful and necessary in order to integrate the various themes connected with staples, regions, and urban development with clarity and brevity. Section II examines the relationship between growth, trade, and structural development in a staples regional economy. Section III mentions briefly endogenous growth factors, primarily to relate the discussion to issues and determinants common in the economic literature. Section IV is concerned with endogenous urban growth and focuses directly on the question of urban function and growth in a mature staples region. Some concluding remarks are offered in section V. While a major aim of this paper is to achieve and elucidate a synthesis of several areas of economic theory, references to Canadian economic and historical development will be made throughout.

The Formal Characterization of a Staples Region

The historical literature on Canadian economic development implicitly assumes a commonly accepted definition of what constitutes a staple region. The notion of a shared starting point may, in fact, be presumptuous. In this paper, no initial assumptions are made concerning technology or factor endowments. The basic characteristic features of a staples region for our purposes are: staples production is primarily for purposes of external trade; the region specializes in staple production; and, therefore, the growth rate of the region is primarily dependent on the growth in trade. We now develop this characterization more formally in order to avoid ambiguities. Detailed statements and derivations are contained in an appendix.

For simplicity, assume that the region produces only two types of output, namely, staples or exportables (X) and manufactures or importables (Y). Of course, not all staples output is exported nor all manufactured goods imported. But the majority of the staple production is exported with only a minority portion being consumed domestically; hence, the staple good can be characterized as the export good. The opposite situation prevails for the composite good "manufactures." In more detail, the regional economy produces Xp units of X (staples) and Yp units of Y (manufactures). The region consumes domestically Xc of X and Yc of Y, thereby exporting (Xp − Xc) of staples for (Yc − Yp) of manufactures. Assume, again for convenience and without loss of generality, that an appropriate choice of units is chosen such that the international price ratio of X and Y goods, P XP Y, is unity. Then real income of the region (Q) is simply defined as

\[ Q = X_p + Y_p = X_c + Y_c \]  

(1)

Assuming that trade is balanced between the region and the rest of the world, the volume of trade (V) for the region is

\[ V = X_p - X_c = Y_c - Y_p \]  

(2)

What determines, then, the trading volume of the region and its growth rate? First, it is necessary to recognize the important role played by the degree to which a region is dependent on its staple. This notion may be rendered more precise by defining the propensity towards staple production; that is, the ratio of staple production to total regional income or output. Thus, we define

\[ \theta^p_x = \frac{X_p}{Q} = \text{the average propensity to produce staples}, \]

\[ \theta^p_y = \frac{Y_p}{Q} = \text{the average propensity to produce manufactures}, \]

where the subscripts refer to the nature of the output and the superscript indicates production. Rates of growth may also be conveniently designated as:

\[ g_Q = \frac{dQ}{Q} = \text{the rate of growth of total output} \]

where Q = initial level of output and dQ = the change in output per unit time period. Similarly, the rate of growth of staples production (g^p_x), and the growth rate of production of manufactures (g^p_y) are defined as follows:

\[ g^p_x = \frac{dX_p}{X_p} \]

\[ g^p_y = \frac{dY_p}{Y_p} \]

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It can be shown\textsuperscript{11} that
\[
g(Q) = \theta_x g_x^p + \theta_y g_y^p
\] (3)

This proposition states that the rate of growth of output of the staples region is a weighted average of the rate of growth of staples production and the rate of growth of manufactures production, and that this rate of growth must lie between the rates of growth of staples and of manufactures. It is obvious, therefore, that the more specialized in staples is a region, the more its overall growth rate will depend on the expansion of staple exports. Under balanced trade, consumption cannot exceed domestic production so the rate of growth must also equal
\[
g(Q) = \theta_x g_x^c + \theta_y g_y^c
\] (4)

This result is the counterpart for consumption of equation (3) above and highlights the role of consumption in determining regional growth.

It is nevertheless possible for growth to take place in staple production without an increase in trade. This can occur if regional consumption of the staple product were to increase. Therefore, it can be shown that the rate of growth of staples production is a weighted average of the rate of growth of the volume of trade for the region \((g_v)\) and the rate of growth of the consumption of staples in the region.\textsuperscript{12} Stated differently, we can establish that
\[
g_p = (1 - \frac{X}{X_p}) g_v + (\frac{X}{X_p}) g_c
\] (5)

Similarly, it can also be shown that the rate of growth of consumption is a weighted average of the growth of trade and of manufacturing production in the region.\textsuperscript{13}

What, then, characterizes a staple region in terms of its production and consumption structure? We are now in a position to answer this question more formally. A staples economy is one characterized by the following two attributes: (a) domestic regional consumption of the exportable good is "small" relative to its production, and (b) the propensity to produce the exportable good is "large" relative to total output. Or phrased differently, \(X_p/X\) is "small," and \(X_p/Q = \theta^p_x\) is "large." How reasonable are these two conditions for characterizing staple regions in Canada?\textsuperscript{14}

A situation satisfying these conditions certainly existed for cod, furs, timber, wheat, pulp and paper, western lumber, and minerals throughout the various phases of Canadian economic development. This has been well established, particularly when it is realized that the staple model refers directly to a single region and not to the national economy as a whole. This somewhat begs the question of what is "small" and what is "large," which must ultimately be a matter of judgement rather than any rigid numerical value. But the judgement is informed by the characterization. If the propensity to consume staples is "small" and the propensity to produce staples is "large," then the overall growth of the regional economy is primarily a function of the rate of growth of staple production, which in turn is directly related to the growth rate of the volume of trade.\textsuperscript{14}

The very nature of a staple implies that demand for the staple outside of the region is exogenous (the assumption being that the staple region is a "small economy" case so that growth in the staple region does not have a significant feedback effect on demand for the staple in the importing region). This means the direction of causality can be unambiguously assigned. It is the exogenous growth in demand for the staple which induces staple growth and hence, ultimately, regional growth; that is, exogenous trade growth rate \(\rightarrow\) staple production growth rate \(\rightarrow\) regional growth rate

\[
g(v) \rightarrow g_p^x \rightarrow g_p
\]

In terms of the staple as a generator of economic activity, the following conclusions may now be drawn:

(i) the rate of growth of staples production is determined exogenously by the rate of growth of trade;
(ii) the staples sector is the "leading sector" with respect to growth;
(iii) the staples sector is highly significant within the region (which means the propensity to produce exportables is large and hence the regional growth rate multiplier is large);
(iv) and therefore overall regional performance is directly and functionally related to the growth in demand for staples, and hence in trade.

Finally, this characterization of a staples region requires no elaborate assumptions concerning technology, factor endowments, income distribution, or the like. It relies principally on the trade opportunities and production structure of the region — namely, the insignificance of domestic consumption and the high proportion of total output of the staple commodity. And while this formulation is faithful to staple-led growth models, it is generally applicable to all export-led growth models.\textsuperscript{15} What distinguishes the staple model is that the export product is a natural resource subject to limited supply constraints (i.e., supply is readily available).

\section*{Growth, Trade, and Structural Development}

In the previous section we established that the growth rate of a staples region was largely determined by its staples production rate, which in turn was determined by the exogenous rate of growth of trade volume. What is the effect of such growth on the economic structure of the staples region? That is, we consider the following types of
questions: As a staples region grows, will it become more or less dependent on trade? Will the regional economy tend to become more or less dependent upon the staple export? In the absence of deliberate government policy, how will the structure of a staples region change over time? And, finally, how can we characterize the change from one "stage" of development to another?

As a regional economy grows, its structure and dependence on trade will change. A customary but useful starting point is to classify the effect of this growth on trade-dependence and economic development in terms of the tendency for the growth process to increase, leave constant, or decrease the average propensity to trade, \( \theta_e \). Accordingly, growth is said to be pro-trade-biased, neutral, or anti-trade-biased as, respectively, \( \theta_e \) increases, remains constant, or decreases as a result of growth.

Whether the percentage of regional output exported, or regional consumption imported (that is, trade) increases, remains constant, or decreases over time will depend on the effect which a change in the demand for staples has on the structure of regional output. Thus, if an increase in demand for staples induces a more than proportionate increase in staple exports [in the jargon of economics, the marginal propensity to export (\( e_e \)) is greater than the average propensity (\( \theta_e \))], then staple growth will have a pro-trade bias. This means that growth results in greater dependency on trade, compared to the initial position before the growth occurred. At the extreme, the expansion of staple production could actually lure sufficient resources away from the domestic market sector to cause an absolute decline in production for domestic consumption. While such a situation may appear extreme, it could occur in the initial stages of staple expansion.

Alternatively, the rate of growth of the staple sector may approximate the rate of growth of domestic production (that is, \( e_e = \theta_e \)), in which case staple growth is neutral. In other words, growth leaves the economic region just as dependent on trade as before. And finally, the marginal propensity to produce for domestic purposes may be greater than the propensity to export (\( e_e < \theta_e \)), in which case staple expansion is anti-trade biased. The extreme case of ultra-anti-trade bias is also very important because it leads to what is often called the "staple trap." This situation occurs when a decrease in demand for staples results in increased reliance on the staple, such as when a decline in external demand for the staple (with concomitant falling staple prices, for example) induces producers actually to increase production of staples at the expense of alternative output in order to maintain export income.

Ultimately, however, these propensities to trade depend on two underlying factors, the propensities to produce and consume both exportables and importables. Thus we must separate the different influences of production and consumption as growth takes place. Consumption patterns may also be pro-trade biased if economic growth induces an increased proportional consumption of imported goods (that is, the marginal propensity to consume imports exceeds the average propensity). Alternatively, growth may be neutral or anti-trade biased in terms of consumption patterns. On the production side an analogous situation may be considered. The marginal propensities to produce staples may promote increased specialization in staples (pro-trade), no change in specialization (neutral), or diversification into manufactures (anti-trade). Taken together, the effect of growth on the structure of the staples region can generally be determined. It should be noted that when biases of consumption and production are in the same direction, the direction of structural change is clear. On the other hand, the two may tend to counteract each other, in which case the end result is ambiguous and depends on the relative strengths of the two effects.

There are, however, certain sensible assumptions that can be made about a staples region. First, rising regional income produced by growth will always result in increased consumption of non-staple goods, whether those goods are produced in the region or imported. (Thus \( e_c > \theta_c \)). Consumption patterns, therefore, will normally promote increased trade. In the early expansion phase (E - stage) of the staple region, this will, in the absence of some form of protectionist policy, be usually buttressed by a pro-trade effect on the production side as well since, by definition, the region has a comparative advantage in the production of staples. Therefore, this implies that as growth proceeds in the face of rising foreign demand for staples, marginal resources will be heavily channelled into staples production. Consequently, these circumstances unambiguously define the early expansionist phase (E - stage) as decidedly pro-trade biased. As the region matures, however, or if policy initiatives (such as tariffs, or subsidies to domestic manufactures) are implemented, diversification may be expected to take place, even if it is limited to producing manufactures or capital goods which directly enhance the exploitation of the resource base. In this phase of development, which we shall term the post-staples-led or mature-stage period (M - stage), marginal resources are increasingly directed into "manufactures" and away from further staple production. Consequently, the contribution of growth on production patterns during the post-staple period is to introduce an anti-trade bias which counteracts, to a greater or lesser extent, the inherent pro-trade bias of consumption patterns.

As the region matures the staple-led boom will moderate and growth of the entire region will slow. This follows from the fact that the growth rate of the region is determined by the growth in staple trade. But the mature stage is characterized by an anti-trade bias in staple production. Hence the declining regional growth rate. 
Thus, we can now summarize the relationships between growth, trade and structural change by distinguishing between the expansion phase, characterized by increased relative specialization in staple production, and the maturing growth or mature stage, characterized by a falling reliance on staple exports.

Endogenous Growth Factors in Staples Economics

In the previous discussion the only source of growth for the regional economy is exogenous demand for staples, measured by the rate of growth of trade. In turn, the regional growth rate and economic structure are determined by the supply response of staple output and the demand for and supplies of consumption goods. However, this scenario would imply constancy in factor endowments, technology, income distribution, consumption and savings patterns, assumptions that are hardly warranted historically. It is impossible to generalize trends in these variables from all the many types of staples that have contributed to various stages of Canadian economic development. Certain observations, however, can be made. Staples, by their definition, are natural resource (or land) intensive. That is, the land/labour ratio in their production is high relative to non-staples. This is true even in the case of mass-settlement-type staples (e.g., the wheat economy) where labour requirements were in the hundreds of thousands as compared to, say, the fur economy, where labour requirements were only in the thousands. On the other hand, the importance of capital intensity cannot be ignored. For this reason, it may be relevant to distinguish also between commercial staples, where the prime capital input is circulating or commercial capital (intermediate goods), and industrial staples, which require significant fixed capital inputs. Obviously, both staple and non-staple growth rates may also be constrained by labour supply, but Canadian experience has been that of a very elastic labour supply in the expansion phases of staple production.

In the case of all staples, growth was accompanied by increased capitalization. Nevertheless, we cannot say with certainty whether the technological changes embodied by investment in staple production has been, or needs to be, labour-saving and capital-augmenting, or neutral. In the case of western agriculture the former would appear to have been the case, at least after the depression. Again it is not altogether clear whether technical progress necessarily favours the staple sector or the manufacturing sector, although here also western agriculture appears to have had a generally higher level of labour productivity increase than other sectors of the Canadian economy. As will become clear, the assumption that productivity growth in staples exceeds that in supporting industries is important to determining urban growth in a staple region.

There has also been a considerable literature on the importance of income distribution, and the resulting consumption and savings patterns, on staple-linked growth. It is not our intent to review this literature here, but it should be noted that income distribution may have a decided impact on the level and structure of demand for "manufactures" (all non-staple production) and on the supply of capital (savings), both factors that will directly affect endogenous growth.

In sum, endogenous growth factors are sufficiently varied and numerous that it makes sense only to analyze them in the context of a specific staple and at a specific period of time. The literature on growth and trade is very extensive and is not considered further here. Our purpose is to point out the relevance of this literature for staples regions.

Location, Specialization, and Endogenous Urban Growth in the Post-Staples-led Period

The previous portions of this paper have been devoted to locating staples-led growth and structure within the more general framework of economic growth and trade theory. The purpose of this section is to relate this staples theory to the question of urban function and growth, not so much in the E-phase, for which some analysis has been attempted, but, rather, in the M-phase or post-staples-led period on which virtually nothing has been written. In addition, we abandon our previous concentration on the equilibrium properties of staples-led growth. Economic development, it is well known, is distinctly different from growth, involving change in structure rather than mere increase of size. The very nature of the historical urbanizing process means that our theory must incorporate elements of disequilibrium analysis, albeit heavily informed by the historical patterns of the western Canadian settlement staple, wheat.

Urban settlements on the prairies in the wheat boom period, 1896-1929, (the E-phase) performed four functions: (i) collecting, processing, and merchandising the staple (transport, financial, and commercial functions); (ii) wholesaling and retailing for domestic regional consumption; (iii) providing certain services (health, education, legal, financial, etc.); and (iv) manufacturing inputs for staple production, as well as products for regional consumption. The unifying characteristic of all these functions performed by the prairie urban centres was their total dependence on agriculture. This is true whether one considers a regional metropolis like Winnipeg or one of the many small hamlets centred on a grain elevator.

The analysis can be simplified by making a few assumptions about the "ideal types" in the urban-hinterland dichotomy. Specifically, we assume

(a) urban centres have a low land/labour ratio; produce exclusively non-staples (that is, manufactures) for
solely regional consumption;
(b) hinterland areas have a high land/labour ratio; produce exclusively staples for export.

It is obvious, then, that urban growth in the staple economy will be primarily determined by the growth in the staple trade, that is, by exogenous factors. This result is no different from that of earlier sections which related overall regional economic growth to the growth in trade. Since the growth of trade is exogenous, so then must be the growth of urban centres serving the regional economy which, in turn, will experience “fast” or “moderate” growth, according as the economy is stationed in the E-stage or M-stage. Thus exogenous urban growth is merely a trivial extension of staple growth theory and of not much interest (which is not to say that it is unimportant, especially to the members of the region).

What is more intriguing is the potential for endogenous growth and structural change, particularly in the period after exogenous demand has ceased to grow (that is, the post-staples-led period). This is important because virtually all previous attention in the literature has been restricted to the role of the staple in the early expansionist phase. The focus of our analysis is concentrated, therefore, on the post-staple period. The critical (and only) assumption we need make is that labour productivity in staple production grows at a greater rate than does productivity in the non-staple sector. As noted previously, this appears to be a realistic assumption for the agricultural economy. For (mathematical) convenience, our analysis is restricted to a single factor, labour, and we also assume that the urban centre and the hinterland constitutes a single labour market with mobility between sectors. This means that wages will be set by the staples sector and transmitted to the non-staple sector. The differential in productivity growth rates between the two sectors means that the relative cost of producing non-staples will increase over time, and this rate of relative cost increase will be given by the differential in the rate of technical progress. The internal “terms of trade,” as it were, turn against the staple, and the economy will react over time to transform itself. The reaction of the economy may take several forms.

Suppose for the moment, however, the above forces have no effect on the structure of the regional economy. This might result from the pursuit by government of a “balanced growth” policy, subsidies to domestic production, etc. In this case, even if the ratio of staples output to non-staples remains constant (that is, no structural change), the differential in productivity growth will result in the progressive transfer of labour from the staple to the non-staple sector. This means there will be increasing urbanization of the labour force, or, what is the same thing, depopulation of rural areas. If the ratio of non-staples production to staples production actually rises in relation to regional income elasticities, the urbanization process further intensifies.

Next, consider the situation in which the relative price of staples and non-staples remains constant. Then, the real per capita growth rate of the region must decline since more and more labour is allocated to the slower productivity growth non-staple sector. “Balance” in the regional structure will depress growth toward the endogenously determined rate of growth of non-staples. However, if the decreasing relative cost of producing staples is permitted to result in the deterioration in the price ratio of staples to non-staples—that is, a deterioration of the terms of trade for the staples—the situation is much more complicated, depending then on the relative price and income elasticities of demand for staples and supplies of manufactures in the “rest of the world” as well as the regions.

This leads to the complicating matter of relaxing the assumption upon which the above two propositions were contingent, namely, that the ratio of staples to non-staples (i.e., the output mix) is constant; either directly as a result of government policy, or as a consequence of fixed relative prices. This fact, and concentration on the importance of differential productivity rates, naturally leads to a preoccupation with supply forces within the region. This is the corollary of the “small country assumption,” namely, that the staple export region is too small, both as supplier of staples or importer of manufactures, to have any effect on “the rest of the world.” The effect of relaxing this assumption is to increase greatly the complexity of the mathematics without altering the general conclusions reached above. Nevertheless, for completeness, we shall indicate briefly the role of external demand. This is necessary because in the staple producing economy, demand is determined entirely outside the region. Consequently, demand patterns given by the rest of the world outside the region will shape the output mix of the staples region itself.

A wide variety of assumptions may be made concerning how demand patterns by the rest of the world for the staples region are characterized. We shall content ourselves by describing the conditions under which external demand conditions lead to unchanging output mix for the staples region. The specific representation of world references we choose in order to analyze the implications of demand for the rate of change in commodity mix is the CES utility function. Employing this particular representation, it can be shown that the relationship between the growth rate of staples and the growth rate of manufactures is given by:

\[
\frac{Y^*}{Y} = \frac{n^Y}{n^X} \cdot \frac{X^*}{X} - \frac{\sigma}{n^X} r \quad (6)
\]

where \(n^Y\) is the income elasticity of demand for manufactures, \(n^X\) is the income elasticity of demand for staples, \(\sigma\)
is the elasticity of substitution and $r$ is the net differential of productivity growth. Equation (6) above permits us to see the importance of demand conditions in determining the output mix. As well, it highlights the importance of relative income elasticities and allows us to state conditions under which output mix will not alter.

It is a basic assumption of the model that staples and manufactures are poor substitutes. This means that $\sigma = 0$ and equation (6) can be written as:

$$\frac{\dot{Y}}{Y} = \frac{n^y}{n^x} \frac{\dot{X}}{X} \text{ or } g_y = \frac{n^y}{n^x} \cdot g_x$$  \hspace{1cm} (7)

Now, if income elasticities of demand for staples and manufactures approach unity (that is, demand in the rest of the world for both staples and manufactures rise proportionally to income), then price ratios being constant, $g_y - g_x$ or, in other words, output mix will remain constant since staples and manufactures grow at the same rate.

It is possible, however, that demand elasticities will not be unity. Take, for example, a cereal staple (e.g., wheat) in which case the income elasticity of demand may well be less than one (e.g., because of a shift to consuming animal products as income rises). Under these circumstances we would have the following:

$$\frac{\dot{Y}}{Y} > \frac{\dot{X}}{X} \text{ since } n^x < 1 < n^y$$

Output mix, therefore, will shift toward non-staple production and, in consequence, speed up the process of urbanization.34

It is also possible, of course, that the income elasticity of demand for a staple is greater than unity, particularly in the case where the staple is a luxury good (e.g., beaver-fur for hatting felt). In this case the rate of growth of staple production will exceed that of manufactures and the process of urbanization will be retarded, possibly even reversed.

Except in this latter case the introduction of demand factors does not materially alter the basic predictions of the disequilibrium dynamics characterizing urban systems in staple regions. In sum, our analysis suggests that:

1) Urban growth and performance are determined by exogenous staple-led trade growth in regions. These regions have urban centres characterized by a high labour/land ratio, and hinterlands characterized by high land/labour ratios. Urban centres specialize in manufactures and hinterlands specialize in staples.35

2) Exogenous trade growth (and fluctuations) determine growth (and fluctuations) in both the regional economy and its urban centres.

3) In regions where staples are, by definition, the leading sector, where differential rates of productivity increase favour the staple, and where mobility of labour be-

tween the staple and non-staple sectors obtains, the following propositions hold:

(a) the relative cost of producing non-staples increases over time;

(b) the labour force and population becomes increasingly urbanized over time;36

(c) the overall rate of growth of the entire region will tend to decline with time (as will urban growth); and

(d) assuming that staples and manufactures are poor substitutes, the introduction of demand conditions does not, except in special cases, introduce any significant modifications to the predictions of the model.

**Conclusions**

This paper is an attempt to integrate and synthesize several areas of economic theory and history regarding staples, growth, trade and urbanization, thereby relating urban growth and development to staples-led growth in the expansion and maturing stages of the staple. Central to our concern is the question of the future of urban systems in the post-staples-led period, that is, after the staple has ceased to be the "engine of growth" as it was in its early (or expansionist) phase.

Our formal analysis underscores the importance of several factors: exogenous demand for the staple, productivity growth rates, and supply and demand elasticities. What it also suggests is that policy concentration on improving the productivity of staple production for export in a period when exogenous demand is not expanding proportionately merely intensifies the rate of urbanization. If the non-staple sector is unable to absorb this flow, the problems of rising urban unemployment, falling (relative) wages and/or regional out-migration must be faced.

The basic assumption throughout has been that no policy initiatives have been introduced that would alter the region’s orientation to staple trade. It is also a simple two-sector model (staples and non-staples) in which the non-staple sector services the regional economy. Obviously, therefore, policy measures, or other economic forces, that broaden the economic base (import substitution, non-staple exports, staple processing, income elastic manufactures or services, relatively more rapid technical change in non-staple industries) would alter the conclusions projected by this paper.

Nevertheless, the post-wheat boom economy in western Canada would appear to support the theoretical predictions and the tendency towards stagnation outlined above, particularly after the dislocations of the depression years.37 What is equally informative is that the tendency towards stagnation in parts of the prairie region was not materially reversed by a broadening of the non-staple base despite rapid urbanization and the type of structural change suggested in the paper, but rather by the develop-
mment of new export industries in mining and petroleum production. This conclusion is modified only to the extent that agriculture has diversified out of staple grain production in favour of other crops and products for domestic consumption. A more detailed enquiry into these matters, however, would take us well beyond the scope and objectives of the present paper.

Our model, however, has some broader implications both for the question of regional development and for the evaluation of the future prospects of urban centres in resource export (staple) regions. It is worth emphasizing that there are, not one, but two versions of the staple model which, simplifying and abstracting, one can label the optimistic and pessimistic versions. The optimistic view sees the growth of the staple export promoting backward, forward and final demand linkages which presumably develop sufficiently such that the regional economy acquires the ability to be self-sustaining; the region becomes independent of the vagaries of external demand for its continued welfare.

The pessimistic version differs not on its mechanics but rather in its prognosis of the ability of a staple based region to escape its dependence on exogenous demand, at least without state intervention. This is the essence of our argument here. If diversification remains dependent on continued staple growth, then slowing of this growth, or worse, decline in exogenous demand, will produce stagnation or regression. Innis captured this pessimistic view in his concept of the "cyclonic" nature of staple development.

The application of this model has been primarily within the context of the prairie wheat economy with specific reference to the implications for the urban system. Throughout, we have disclaimed its application to other resources where staple exploitation takes place within an urban context (i.e., "nodal" growth). In fact, however, the model applies equally well except that there now is no distinction (in terms of residence of the population) between rural and urban. The urban centres will thus behave as if they were the region and the rural to urban shift associated with the mature stage of the staple characterized by a widely dispersed population and labour force will be replaced by an industrial and occupation shift within the urban centre itself in a nodal staple such as fishing, mining, or pulp and paper. However, in our view, barring some interventionist policy that would promote the development of linkages and a broadening of the economic base, the likely result of the maturing of the staple region will be a decline in labour demand and hence a falling urban population associated with these types of resource industries.

APPENDIX

The purpose of this appendix is to demonstrate in a more formal fashion certain propositions discussed in the text, thereby enabling the interested reader to examine in greater detail such issues as the nature of the assumptions and the structure of the model framework.

1. We begin by summarizing the model of a regional economy presented in the text. The region produces \( X_p \) of \( X \) (staples) and \( Y_p \) of \( Y \) (manufactures), consumes \( X_c \) of \( X \) and \( Y_c \) of \( Y \), therefore, exporting \( X_p - X_c \) of \( X \) in return for \( Y_c - Y_p \) of \( Y \). Assuming that \( P_Y/P_X \), the international price ratio, is unity, real income of the region is

\[
Q = X_p + Y_p = X_c + Y_c,
\]

and

\[
V = X_p - X_c = Y_c - Y_p.
\]

is the volume of trade under balanced conditions. Define \( (X_p/Q) = \theta_p \) as the average propensity to produce staples, \( (Y_p/Q) = \theta_c \) as the average propensity to produce manufactures, etc. Henceforth superscripts \( p \), \( c \) refer to production and consumption, \( X \), \( Y \) refer to staples and manufactures, and \( V \) refers to the volume of trade.

2. Let \( dQ \) refer to a change in output, and \( Q \) be the initial level. The rate of growth of output is simply

\[
\frac{dQ}{Q} = \frac{dQ}{Q}
\]

Similarly, \( g_p \), \( g_c \), \( g_v \), etc. are defined analogously as the rate of growth of production of staples, the rate of growth of production of manufactures, the rate of growth of the volume of trade, etc.

3. We may now show that

\[
g_p = \frac{dX_p}{Q} + \frac{dY_p}{Q} = \frac{X_p dX_p}{Q} + \frac{Y_p dY_p}{Q} = \theta_p g_v + \theta_c g_c
\]

That is, the rate of growth of regional output is a weighted average of the growth rates of staples and manufactures.

4. Similarly,

\[
g_v = \frac{dV}{V} = \frac{dX_p - dX_c}{X_p - X_c} = \frac{dX_p}{X_p} - \left\{ \frac{dX_c}{X_c} \cdot \frac{X_p}{X_c} \right\} = \frac{g_p - g_c \left( \frac{X_c}{X_p} \right)}{1 - \frac{X_c}{X_p}}
\]

Re-arranging, we have

\[
g_v = \left( 1 - \frac{X_c}{X_p} \right) g_p + \left( \frac{X_c}{X_p} \right) g_c
\]

In other words, the rate of growth of production of staples is a
(5) It is easy to show, in an analogous fashion, that
\[
\eta_y^* = \left(1 - \frac{X}{X_p}\right) \eta_y + \left(\frac{X}{X_p}\right) \eta_y^*
\]

From (4) we see that
\[
\eta_y^* \sim \left(1 - \frac{X}{X_p}\right) \eta_y \text{ where } \frac{X}{X_p} \to 0
\]

From (3) we see that
\[
\eta_y^* \equiv \theta^*_y \eta_y \text{ where } \theta^*_y \to 1
\]

Hence \(\eta_y^* \to \eta_y\). Note that the two essential defining attributes of a staples region are necessary to derive these results; namely, that domestic consumption of staples is small \(X/X_p \to 0\), and the propensity to produce staples is large \(\theta^*_y \to 1\).

(7) Define \(\eta_y^* = \epsilon_y^* / \theta^*_y\) as the elasticity of supply of staples where \(\epsilon\) and \(\theta\) refer to marginal and average propensities respectively. We can distinguish between

<table>
<thead>
<tr>
<th>Region</th>
<th>Marginal Propensity</th>
<th>Average Propensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-stage: (\eta_y^* &gt; 1)</td>
<td>(\epsilon_y^* &gt; \theta^*_y)</td>
<td></td>
</tr>
<tr>
<td>M-stage: (\eta_y^* &lt; 1)</td>
<td>(\epsilon_y^* &lt; \theta^*_y)</td>
<td></td>
</tr>
</tbody>
</table>

Since \(g_y^* = \epsilon_y^* \eta_y\), then \(g_y = g_y^* / \eta_y^*\). Hence for the same \(g_y^*\), \(g_y\) will be smaller in the M-stage than in the E-stage. In other words, the rate of growth of the regional economy is smaller in the mature stage.

(8) Let \(Y = aL_1\) and \(X = bL_2\) be the production functions relating \(X\) and \(Y\) to their labour inputs \(L_1\) and \(L_2\) respectively, where \(a\) and \(b\) are constant structural coefficients. Let \(r\) be the net differential in productivity growth. Let \(W_t = W e^{\epsilon_t} = e^\epsilon\), that is, wage rates grow at the rate of productivity growth and the initial wage level, \(W\), is set at unity for convenience. Therefore, the cost functions for \(Y\) and \(X\) are, respectively,

\[
C_Y = \frac{W_1 L_1}{Y} = \frac{W e^{\epsilon_1}}{a^{\epsilon_1}} = \frac{e^\epsilon}{a}
\]

\[
C_X = \frac{W_2 L_2}{X} = \frac{W e^{\epsilon_2}}{b^{\epsilon_2}} = \frac{1}{b}
\]

hence \(C_Y/C_X = \frac{b}{a} e^\epsilon\), that is, the cost of \(Y\) (non-staples) rises relative to \(X\) (staples) over time. In particular, if relative prices are supplied determined, it is also easy to show that

\[
\frac{P_Y}{P_X} = \frac{P_Y}{P_X} = r, \text{ where } \frac{P_Y}{P_X} \text{ is the percentage rate of growth in price, } P_Y.
\]

In other words, the rate of price decline of the staple is determined by the net differential of productivity growth.

(9) Let \(Y = \frac{L_1}{a X} = K\), a constant

Then \(L_1/L_2 = Ke^{\epsilon}\). By definition, \(L = L_1 + L_2\), so that \(L_1 = (L - L_2) Ke^{\epsilon}\). Therefore,

\[
L_1 = \frac{1}{1 + Ke^{\epsilon}} L, \quad L_2 = \frac{L}{1 + Ke^{\epsilon}}
\]

and as \(t \to \infty, L_1 \to L, L_2 \to 0\). That is, in the limit there is a tendency for the complete de-population of the staple sector.

More and more labour (population) must be transferred to the non-staple sector (cities).

(10) Let total output, \(Q\), be defined as \(Q = P_Y + P_X = P_y a L_1 + P_b b L_2 e^\epsilon\). Again, assuming for convenience \(P_x = P_y = 1\), we have

\[
L_2 = \frac{1}{K} L_1 e^{-\epsilon} = V L_1 e^{-\epsilon} \text{ where } \frac{1}{K} = V
\]

Hence \(Q = (a + b) V L_1 = RL_1\) where \(a + b = R\).

Measuring growth conventionally as output per capita (or worker), we have

\[
\frac{Q}{L} = \frac{Q}{L_1 + L_2} = \frac{RL_1}{L_1(1 + Ve^{-\epsilon})} = \frac{R}{1 + Ve^{-\epsilon}}
\]

which demonstrates that as \(t \to \infty, \frac{Q}{L} \to R\), a constant. In other words, the growth rate of the regional economy declines to some constant over time.

NOTES


4. The model is not appropriate for “nodal” type staple development (e.g., mining, pulp and paper, or fishing) where there is no differentiation between the staple production site and the supporting urban centre or labour force.

5. See, for example, the classic article on trade and growth biases by H.G. Johnson, “Economic Development and International Trade,” in Money, Trade and Economic Growth (London: Allen and


9. See, for example, the discrepancies in the definitions of a staple between Caves and Holton, The Canadian Economy, p. 31; and A.W. Currie, Canadian Economic Development (Toronto: Thomas Nelson, 1951), p. 5.

10. In relation to historical staples in Canada, for example, some furs were retained for use as clothing by the traders while provisions and capital goods such as pemmican and canoes were produced in the staple region. In the case of wheat, some was retained for domestic consumption while local blacksmiths produced specialized farm machinery for local use, etc.

11. See Appendix: (3).

12. See Appendix: (4).

13. See Appendix: (5).

14. See Appendix: (6).


16. This is the special case of ultra pro-trade bias.

17. The expansion of the fur trade lured habitants away from agriculture as Coureurs de bois, thus prompting attempts at repression by the French authorities. The expansion of the wheat economy likewise lured farmers away from mixed farming for the domestic market and capital from industrial development. This is the import of Pentland's comment regarding the National Policy which, instead of promoting the development of an interdependent economy, promoted the development of a dependent economy. The National Policy of 1879 was one weapon of Canadian imperialism. Its purpose was not to make Western Canada, also, a participant in a self-contained economy, for the west was fully expected to sell its staple product in world markets, as it did, and there appears to have been no regret that the New Canadian structure was thus made more vulnerable and dependent than its predecessor. See H.C. Pentland, Labour and Capital in Canada 1650-1860, (Toronto: Lorimer, 1981), p. 173. B.C. history is replete with many examples of labour and resources abandoning existing pursuits for the lure of gold fever. In more recent years, the history of underdeveloped countries gives numerous examples of retreat to increasing reliance on staple exports.

18. In notational form, we have:
affected by drought and consider only the post-war decade, the growth rate in agricultural productivity outstripped all other sectors and resource industries were second. This also coincides with the major period of mass rural-urban migration, particularly in the prairie region.


25. See note 5, above.


27. The assumptions should not be interpreted literally. The ideal type is used only for analytic convenience and simplicity, but the conclusions hold generally, given specialization between rural and urban areas in staples and non-staple production.

28. This assumption could also be justified on theoretical grounds. As long as land is abundant for staple production, it is not a factor constraint. At the same time, land is not a significant input in non-staple production. Also, services which comprise a large part of non-staple production tend by nature to be labour-intensive and not readily amenable to mass production techniques nor adaptable to inanimate energy types of technology that have historically been the prime source of productivity increase.

29. See Appendix: (8).

30. See Appendix: (9).

31. See Appendix: (10).

32. This is the same as saying that the demand for staples and the supply of manufactures are perfectly elastic.

33. See Smith, "Baumol's Unbalanced Growth Model." The CRES, or constant ratio of elasticities of substitution utility function, has the following properties. Income elasticities are proportional to the elasticity of substitution, and vary with the level of consumption. Our price elasticities are also related to the elasticity of substitution as well as the proportion of budget spent on the good. In sum, we may relate much of the price and income effects to the parameter: elasticity of substitution.

34. This must be qualified if we relax the assumption stated earlier that all "manufacturing" takes place in the urban centre. If income elasticity in the staple region for "manufacturers" such as animal products is greater than 1, and animal products are also produced in the rural area, then shifts in relative demand will reduce the rate of urbanization. In fact, since the depression the relative mix of field and animal production in the prairie region has shifted towards the latter. See Phillips, "The Prairie Urban System, 1911-1961," p. 19.

35. This excludes regions of localized staple production such as fishing and mining where staple producers reside in "urban" centres. It is not, however, restricted to what has been designated as a settlement staple since both fur and timber trades have had a widely dispersed labour force but which have not resulted in permanent settlement.

36. This assumes that labour force and population are proportional in both regions. To the extent that migration is selective by family size, or birth rates vary differently in the two sectors, the rate of urbanization of population may differ from the rate of urbanization of the labour force.


38. See Derek Hum, "The Future Economic Prospects of Winnipeg: An Analytic Speculation," in Tony J. Kuz, ed., Winnipeg: 1874-1974, Progress and Prospects (Winnipeg: Queen's Printer, 1974), pp. 239-48. See also McCann, "Staples and the New Industrialism ...." McCann compares the failure of Halifax to engage in staple processing with Vancouver's success in doing so and concludes that this partly explained Halifax's slow and restricted industrial growth. He also emphasizes that Halifax was a city at the periphery while Ontario and Quebec counterparts were located in the heartland. The import of this observation is that a full analysis is only possible taking into account the entire urban system and national market structure, and not merely a single city in isolation. Our paper, being restricted to a single region or city, is therefore a first step towards a complete formal system.