

STAPLE THEORY AND EXPORT-LED GROWTH: CONSTRUCTING DIFFERENTIAL GROWTH

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The staple theory is a subset of the export-led growth hypothesis, designed to explain the growth and economic development of resource-rich economies. It is a theory that has been misunderstood and is seen to be at odds with the stylised facts of economic growth and development as well as with mainstream neoclassical wisdom. This article presents a brief and critical historiography of the staple theory from which a simple model of staple growth and development is gleaned. As well, data are presented which suggest that staple theory remains an important analytical tool to help explain economic development and growth.

INTRODUCTION

The central proposition of this article is that the staple theory of economic growth, originally based on the oeuvres of Canadian economic historians, remains an important contemporary model and framework for economic analysis in spite of the forceful critiques put forth from the 1950s. I argue that staple theory helps explain the causes of different real per capita gross domestic product (GDP) growth rates through time in a particular region or country and patterns of differential per capita growth rates between regions and countries. This is achieved by identifying the necessary conditions for exports to increase real per capita GDP growth from what it would be in the absence of such exports. Staple theory, therefore, contributes towards an explanation of the lack of convergence of real per capita GDP between regions and nations.¹ This stylised fact is a question of fundamental importance that remains to be addressed by economic theory.

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1 On the absence of convergence see, Altman, Social; Baumol, Productivity; DeLong, Productivity; Pritchett, Divergence.

The staple theory, therefore, serves to complement the recent research in growth economics, which aspires to explain the persistence of differentials in per capita growth rates, and in real per GDP.²

Although one side of the analytical equation related to economic growth is represented by the relevant stylised facts, the other side of the equation is represented by the theory that purports to explain the stylised facts and plays a critical role in determining which stylised facts are of analytical importance. In a very important sense, it is theory that determines whether or not a particular explanation is acceptable, not a particular set of facts, and moreover, it is theory that tends to guide and direct empirical analyses.³ For this very reason, it is important to address the underlying causal assumptions of a staple theory of economic growth as well as those of the competing theoretical constructs used to critique the staple theory.

A fundamental assumption of staple theory is that in the absence of staple exports a region would be significantly poorer in terms of per capita GDP. In other words, all factor inputs are assumed not to be equally productive either in a static or dynamic sense. Following upon the various contributions to the development of the staple theory and related critiques, I construct a synthetic representation of this theory. This article therefore represents a revision and refashioning of the classic exposition of staple theory put forth by Watkins.⁴ No attempt is made, however, to build a comprehensive and operational rendition of the staple theory by engaging in a textual account and discussion on what the original proponents of the staple thesis did or did not say. I argue that staple theory is best viewed as an export-led growth theory, which incorporates both supply and demand sides into its modelling framework. Staple theory must articulate an understanding of the details of the supply-side as it relates to staple exports, which includes the question of technological change and transfer as they relate to the process of staple exports as well as an understanding of demand side shifts, and both supply and demand elasticities. Also of fundamental importance are the possible linkages (and their determinants) which staple exports have to the larger economy and therefore the growth process. Moreover, staple theory posits a positive causal relationship between the economic and social infrastructure of a region and the extent to which staple exports are realised and can positively affect real per capita GDP. The path and pattern of per capita economic growth are, to an important extent, a product of public policy and, therefore, fundamentally depend on the supply-side of the economy, provided there exists a market for the export staple.

2 On explanations for the persistent lack of convergence see, for example, Abramovitz, *Catching-up*; Altman, *Human*; Behavioral; Arthur, *Positive feedbacks*; Grossman and Helpman, *Endogenous innovation*; Lucas, *Mechanics*; Parente and Prescott, *Barriers*; Romer, *Increasing returns*; Endogenous.

3 Coase, *Essays*, pp. 26–28.

4 Watkins, *Staple*.

THE LEGACY OF HAROLD INNIS

The staple theory was developed by Harold Innis, an economic historian *cum* institutional economist at the University of Toronto, to help explain the process of economic change in newly settled regions (such as Canada) with a relatively small population base but an abundance of land and other natural resources. Innis believed that the economic evolution of Canada and like countries could not be satisfactorily explained by the theories of the time (1920s and 1930s). The staple theory was developed from a detailed and judicious analysis of the economic history of Canada; placing Canada in the context of economic, technological, informational, and institutional parameters of which it was part. His writings had an important influence both outside and inside Canada, affecting the writing of economic history and the development of economic theory internationally.⁵ Staple theory did not develop in a vacuum. In 1923, Mackintosh, incorporating 'the basic facts of economic and historical geography', provided an important outline to the theory that Innis later developed and added much empirical weight to, in an era when Canadian history was being written largely in terms of individuals and politics.⁶ Mackintosh argues that critical to the economic development of Canada and the United States was markets for staple products (with an emphasis on raw materials) and the ability of people to overcome or take advantage of geographical factors to bring the staples to these markets competitively. Thus, staple exports serve to drive the development process, both in terms of intensive and extensive growth. Mackintosh acknowledges the influence of the work of Guy Callender on American economic development, where a clear connection between staples and economic development is articulated.⁷ Innis argued that, since the beginnings of European settlement, the Canadian economy and society has been deeply affected by the production of staples, from cod, to fur, to timber, to wheat, to nickel, and hydroelectricity because of the economic advantages to be had from such exports. Initially, staples were sought after since only by exporting staples to the home country in Europe at a profit could the new migrants realise a standard of material well-being obtainable in Europe. In exchange for staples, European goods could be purchased that contributed to a high level of material welfare in the colonies.⁸ What Innis implicitly assumes is that if factors of production had been reallocated to non-staple production, real output per capita would have been lower than it actually was. Moreover, it was the potential profitability of staple products that attracted immigrants and, therefore, staple exports were strongly related to the process of extensive economic growth or the growth in total output. In pursuit of profitable staples the settlers

5 See, for example, Chambers and Gordon, Primary; Caves, Vent; Export-led; Fogarty, Staples; Galenson and Menard, Approaches; McCusker and Menard, *The Economy*, Pomfret, Staple; Schedvin, Staples; North, Location; Agriculture; Watkins, Staple.

6 Mackintosh, Economic Factors, p. 15. See also, Neill, *New Theory; History*; Watkins, Staple.

7 Callender, Early transportation.

8 Innis, Importance, p. 16.

sought new products, but equally worked to reduce their production costs. In particular, they sought to modify and improve the transportation systems through which staples were exported and European goods imported. For this reason, the importance of transportation to the evolution of the Canadian economy should not be underestimated. Efforts to reduce production costs involved economic agents at the level of both the firm or farm and government. The staple theory is, therefore, very much a supply-side theory of economic development whereby a country's capacity to grow is determined by the ability of its people to competitively produce staple products for markets over which they have little control. Demand is exogenously determined. But staple producers can affect the costs of production (such as the cost of transportation), and thereby shift the supply curve of the staple product(s) to a competitive position. Once staples can be sold it is assumed that they yield a higher level of per capita output than could otherwise be achieved. The importance of the supply-side to the staple theory is illustrated in Figure 1. Whatever the price elasticity of demand, be it perfectly elastic (D_0) or somewhat inelastic (D_1), the staple producers can affect the course of economic development by affecting the supply curve. At (S_0) the staple product cannot be sold. But by reducing transportation costs, for example, the supply curve is shifted to (S_1) and the staple becomes marketable. Given the demand curve, further shifts

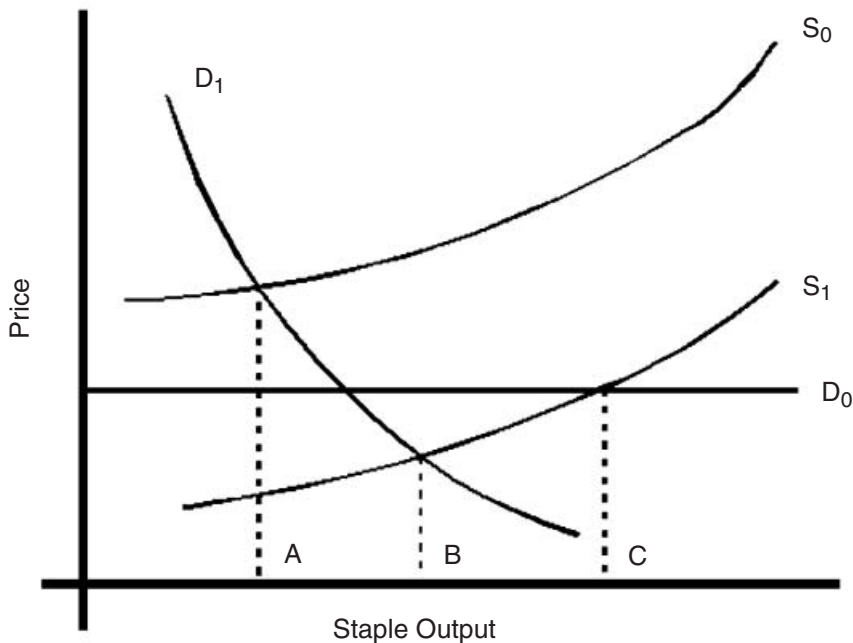


Figure 1. Supply and demand and staple production.

in the supply curve yield further increases in staple exports. The demand-side is also of importance. The demand elasticity affects the quantity that can be sold as prices fall [compare the quantity sold under (D_0) to that sold under (D_1)]. Shifts in the demand curve as markets expand through increases in population or in disposable income per capita or through changes in tastes, improve the position of the staple producers irrespective of their supply curves. Given that the non-Canadian component of demand is exogenously determined, staple-led economic growth can only be driven domestically by shifts in the supply curve. In other words, shifts in the demand curve are not a necessary condition for export-led growth. On the other hand, given the demand curve, shifts in the supply curve are necessary to motivate the process of export-led growth.

This emphasis on the supply-side is consistent with Kravis' critique of export-led growth theories, where he underlines the importance of domestic supply-side variables to export-led growth. He argues: 'The mainsprings of economic growth were internal; they must be sought in the land and the people and in the system of social and economic organization.' Therefore, trade expansion should be viewed: 'as a handmaiden of growth rather than as an autonomous engine of growth.'⁹ Related to this, Rodriguez and Rodrik find 'that firms derive technological or other benefits from exporting per se; the more common pattern is that efficient producers tend to self-select into export markets. In other words, causality seems to go from productivity to exports [supply-side changes], not vice versa.' As North reiterates, growth can be export-led even if the mainsprings of trade expansion are found on the supply-side. For this reason, ignoring the supply-side in investigating and identifying sources of export-led growth tends to paint an incomplete and misleading picture of the growth process.¹⁰ What is of fundamental importance is whether or not staple exports, be they gotten by shifts in the demand or supply curve, underlie the process of per capita economic growth. In light of this discussion, it is important to note that there is strong evidence to support the proposition that staple exports have played an important role in driving the growth process in many countries in the twentieth century.¹¹

Innis argues that a region's attachment to staple production tends to become cumulative. The production of staples results in staple producers becoming more efficient in their tasks and attracting more of a region's resources to the increasingly efficient staple industries. The economic evolution of the staple-producing region becomes subordinate to staple production. This is true for the industry, trade, finance, and agricultural sectors as well for government activities. and the

9 Kravis, *External*, p. 850, 859, *Trade*, and *Role*.

10 Rodriguez and Rodrik, *Trade*, p. 39 and North, *Location*, p. 248. McInnis, *Early Ontario*, argues, on the contrary, that staple theory is defined in large part by whether or not staple exports are demand-side driven thereby shifting attention away from the critical issue of the importance of exports to economic growth.

11 Reynolds, *Economic Growth*, pp. 43–48; Sach and Warner, *Natural resource*.

type of staple found in a country (its production function) plays a large role in determining the particular connection(s) between staples and the growth process. Continued dependence on staples is expected to result in a country's dependence on export markets and on foreign supplies of manufactured goods. This can possibly result in a highly volatile economy, although characterised with a relatively high level of average per capita output.

THE STAPLE THEORY REFINED

Staple theory has undergone many developments over the years, resulting in a richer and analytically more rigorous framework. Of particular importance is the introduction of the concept of economic linkages, which is related to input-output analysis pioneered by Wassily Leontief.¹² There are backward, forward, demand, and fiscal linkages. The backward and forward linkages refer to economic activities or industries related to the production and servicing of the staple and to the further processing of the staple respectively. Backward linkages refer not simply to activities related to the immediate production of the staple product, but also to the production of the infrastructure, such as transportation, necessary to make staple production economically viable. The more elaborate and substantial these linkages are, the greater the impact staple production can have upon the process of economic development. For many staple theorists these linkages are related to the production function of the staple product.

The demand linkage, which Innis paid little attention to, relates to the demand generated in the process of staple production. This demand can affect the development of new economic activities, in either the secondary or tertiary sectors of the economy, which serve to meet the needs of the staple producing population. When these economic activities serve local consumption needs, Douglass North refers to them as residentiary industries. The economies generated by these staple-linked industries can attract other industries to an area and some of these industries might even become export-oriented. If transportation costs were not important to their unit costs of production these industries would be footloose. Moreover, staple production and the economic linkages that it generates can give rise to the growth of nodal centres that are home to staple and related industries.¹³ Staple-linked demand, however, can always be used to import products instead of stimulating the growth of local industries. Watkins summarises the importance of linkages: 'The central concept of a staple theory . . . is the spread effects of the export sector, that is, the impact of export activity on domestic

12 Hirschman, Generalized; North, Location, Agriculture; Watkins, Staple.

13 North, *ibid.*

economy and society. To construct a staple theory, then, it is necessary to classify these spread effects and indicate their determinants.¹⁴ Staple theorists at least implicitly assume that staple-related linkages generate a higher level of per capita output than would be produced in their absence.¹⁵

Directly related to the demand linkage of staple exports is the distribution of income. Baldwin makes the case that where income is relatively unequally distributed there are few market opportunities to develop local industry.¹⁶ The wealthy tend to import to meet their needs for luxuries as their per capita income increases with the rise of staple exports, whereas the poor stay poor in spite of increasing staple exports and spend their low income on the bare necessities of life. Moreover, it is argued that the wealthy do not devote the majority of their incremental income to investment-savings; much of their savings are dissipated on luxuries. Actual savings represents only a portion of potential savings, where the latter consist of income above and beyond what is required to meet the basic needs of individuals. This surplus income can be saved or consumed, often in terms of 'conspicuous consumption'.¹⁷ If individuals or the state consume rather than save and invest surplus income, higher levels of surplus real income need not contribute to the process of capital accumulation and, thereby, to the process of economic growth.¹⁸

To Baldwin, a more equal distribution of income creates an economic environment conducive to the development of local industry, by generating a market for output that does not have immediate export potential. As per capita income increases, in a world with a more equitable income distribution, individual and household demand moves beyond the basic necessities of life, where there is a much greater income elasticity of demand – demand is non-homothetic. The larger market allows the production of these products to become economically viable, allowing them to take advantage of economies in larger scale production and multiplier–accelerator interactions.¹⁹ On the supply-side, a highly skewed distribution of income that is predicated upon relatively low returns to labour either on the farm, in the fishery, or in the factory, serves to reduce the level of labour productivity and thereby per capita income by inducing lower levels of economic efficiency and relatively low rates of technical change. Low returns to labour reduce the incentives and the pressures for firms to become more productive.²⁰

14 Watkins, *Staple*, p. 144.

15 North, *Location, Agriculture*, is explicit on this point.

16 Baldwin, *Patterns*.

17 Harris, *Economy*; Baran, *Political economy*; *Economic progress*.

18 Baran, *ibid.*

19 Baldwin, *Patterns*, p. 176. See Murphy, Shleifer and Vishny, *Income*, for a contemporary statement of the positive role which a more equal distribution of income plays in industrialisation.

20 Altman, *Human*, ch. 4, *High wage*, *Behavioral*, *Worker*; Habbakkuk, *American and British*.

Baldwin argued that income distribution is determined by the production function of the staple product which, in turn, determines the type of economic organisation necessary to produce the staple (slavery versus the freehold system of land tenure, for example). But it is has become evident that the same output can be profitably produced under different systems of land tenure or economic organisation, yielding different distributions of income and thus dramatically different demand linkages. Thus, an identical staple can yield different paths of economic development.²¹ In this case, the potential demand-side impact of staple production is affected by the institutional parameters within which staple production takes place. And, individuals and government can affect such parameters.

Fiscal linkages relate to the income that the state receives as a result of staple and staple-related production. These linkages can result in the investment in social overhead, such as transportation, education, research and development. Fiscal linkages can make the staple economy more efficient and competitive (external economies are generated). In this sense, the state can use staple-related income to improve an economy's 'social capabilities'. On the other hand, the state can use its staple-related stream of income unproductively. The direction of fiscal linkages can, therefore, influence the course of the staple-producing country's development.

The concept of linkages incorporates the proposition that although the staple sector may be a leading sector in the economy, other sectors might develop as a consequence of staple production through its multiplier effect on the rest of the economy. The staple sector(s) need not be quantitatively the most important. As North points out, even if staple production does not dominate an economy in terms of employment or output, this does not mean that staple production is not the dominant force in the economy if, by way of linkages, many of the economy's industries are dependant on staple production.²² What the revised staple theory suggests is that if staples are important to the growth process, staple exports will lead economic change both through direct and indirect (linkages) effects on the economy, even if staple exports themselves constitute a small percentage of GDP. Eventually staples might become of only marginal importance to the growth process as internal factors, largely independent of exports, take over the driver's seat in directing the process of economic change. It is, however, quite possible for a country to fall into a 'staple trap' where the staple economy does not develop the potential linkages associated with particular staple(s). For this reason, it is possible for a staple economy to evolve into a relatively low per capita income economy.²³

21 See, Altman, Behavioral, Quantitative, *Worker*, Blum, Rise; North, Agriculture; and Schedvin, Staples.

22 North, Location, Agriculture.

23 See, Caves, Vent; North, Agriculture; and Schedvin, Staples. There is some evidence that many staple economies have fallen into a 'staple trap' (Sachs and Warner, Natural resource).

ISOLATING THE PROBLEMATIC

The neoclassical context

A serious criticism levied against the staple theory, one which remains a cornerstone of subsequent critiques, is vested in the theoretical modelling of the staple theory articulated by Chambers and Gordon which, in turn, is built upon a very simple neoclassical worldview. Their analysis is contextualised by an examination of the possible impact staple exports had on Canadian economic growth during 1901–1911, a period characterised by a boom in Canadian wheat exports and considered by many scholars as having been critical to Canada's economic development.²⁴

In terms of the mechanics of intensive economic growth, growth in real output per capita can be expressed as:

$$\frac{\dot{Y}}{P} = \dot{Y} - \dot{P} \quad (1)$$

where dot represents the average rate of growth of a variable per unit of time and Y and P represent real income or gross domestic product and population respectively. Since the level of real income equals the level of labour productivity times the number of workers employed (assuming that all workers are equal in terms of hours worked), the growth rate of real income can be expressed as:

$$\dot{Y} = \frac{\dot{Y}}{L} + \dot{L} \quad (2)$$

where L is the number of workers employed and $\frac{\dot{Y}}{L}$ is labour productivity. The rate of growth in real per capita output can, therefore, be rewritten as:

$$\frac{\dot{Y}}{P} = \frac{\dot{Y}}{L} + (\dot{L} - \dot{P}) \quad (3)$$

Per capita output growth is clearly a positive function of the growth in labour productivity, $\frac{\dot{Y}}{L}$, and whether or not employment grows at a faster pace than population or whether the percentage of the population that is employed increases. Staple theory implicitly assumes that an export boom in staples will at a minimum serve to increase the rate of growth in labour productivity.

24 It is important to note that Chambers and Gordon's, Primary, theoretically embedded empirical test of the staple theory followed upon earlier detailed empirical work of Firestone (Canada's), on Canadian GNP and Bertram (Economic growth) on Canadian manufacturing which challenged the traditional view that the wheat boom era was characterised by a major break with the past or the future. This challenge has, itself, been seriously questioned, if not refuted, by more recent empirical work on Canadian economic growth (Altman, Revision, Revised real, Evolution, and Quantitative; Urquhart, New; Green and Urquhart, New).

What determines the latter is decomposed into key components in the basic neoclassical growth model developed by Robert Solow in 1956. In his analytical framework the long-run equilibrium level of real output is given by factor inputs, reduced to capital and labour, and exogenously given technological change. Given the assumptions of constant returns to scale, diminishing returns to individual inputs, no production externalities, long-run perfect competition, 'full employment', and the equality between employment and population growth, the level of per capita output is determined by an exogenously-given propensity to save, which sets the capital per worker ratio, and by the rate of technical change.²⁵ It is further assumed that production is x-efficient and, therefore, all economic agents are working as hard and as well as they can.²⁶ A critical point that follows from the Solow model is that there is a limit to which per capita output can be increased by way of increasing the capital-to-labour ratio and a limit to which the propensity to save can be increased. Only sustained increases in technological change can yield sustained rises in labour productivity and, thereby, in real per capita output.

The basic Solow growth model can be expressed as:

$$n + m = \frac{s}{\left(\frac{K}{Y}\right)} \quad (4)$$

where m is the rate of technical change, n is the employment growth rate, s is the average propensity to save and (K/Y) is the capital to labour ratio. Higher rates of technical change yield higher rates of economic growth and higher levels of per capita output. In Solow's basic model, technical change is exogenous and autonomous. It is independent of and not affected by movements in the model's other variables and is, in the Solow parable, a catch-all phrase for all variables other than capital which contribute towards increasing labour productivity or as Abramovitz refers to it, a measure of our ignorance. Technical change is like manna from heaven and is left unexplained in the model.²⁷ But clearly, differences in the rate of technical change, however explained, as well as differences in the propensity to save, yield differences in per capita income.

With respect to the staple hypothesis, it is implicitly assumed that a staple export boom will have a differential and positive effect on the propensity to save (assumed to be identical to investment) and on the rate of technical change, and thereby on the level of per capita income. Exports are linked to per capita income levels and rates of growth through their positive effect on the rate of capital accumulation. Since technology is embodied in plant and equipment, best practice technology cannot easily be incorporated into the production process unless there is

25 Solow, Contribution.

26 Altman, *Human*, High Wage, *Worker*; Leibenstein, Allocative.

27 Solow, Contribution, Technical progress; Abramovitz, Resource.

an increase in the rate of capital accumulation. Increasing the rate of capital accumulation increases the rate at which best practice technology is diffused throughout the economy, replacing the earlier vintages of capital stock with the more productive latest versions. In this sense, capital accumulation is the instrument that allows for the actualisation of technical change, which remains the primary engine of economic growth.²⁸ Therefore, to the extent that a staple export boom stimulates capital accumulation, staple exports can be said to contribute to increases in per capita output. However, technical change will take place only if the appropriate social capacity, inclusive of human capital, is present.²⁹ In other words, as Ruttan concludes: 'It should now be obvious that differences in productivity levels and rates of growth cannot be overcome by the simple transfer of capital and technology.'³⁰ Technical change appears to be a necessary but not sufficient condition for persistent per capita growth where, according to staple theory, the export of staples accelerates the process of technical change given the existence of the necessary economic and social infrastructure, which is a supply-side rather than a demand-side phenomenon.

Staple exports can also affect the level of per capita output and growth through their potential impact on the structure and economy. The basic Solow model pays no heed to this possibility since it abstracts from the effects of sectoral differences in productivity levels and growth rates and, in this context, the dynamic effects of structural change. Nevertheless, Simon Kuznets, in his classic empirical work on economic growth, stressed the importance of structural change in the economy, with labour shifting into the more productive sectors of the economy and into relatively more productive industries and product lines as being of fundamental importance to sustained per capita growth. Such structural change, itself, reflects the changing structure of demand.³¹ To the extent that a boom in staple exports shifts labour into more productive industries or sectors, it contributes towards increasing an economy's per capita output. This point can be illustrated as follows:

$$\frac{Y}{L} = L_a \left(\frac{Y}{L} \right)_a + L_b \left(\frac{Y}{L} \right)_b \quad (5)$$

where L_a and L_b are the shares of labour in sector a and b respectively. If increasing exports result in labour shifting into the higher productivity sector, total labour productivity increases and, *ceteris paribus*, so does per capita output.³²

A long-standing potential linkage between exports and per capita economic growth is related to the Smithian notion of increasing returns to scale and exter-

28 Maddison, *Dynamic Forces*, pp. 65–66, 141–144; Nelson, 'Diffusion' model; Salter, Productivity; Solow, Investment.

29 Abramovitz, *Catching up*; Altman, *Social*; Easterlin, *Why isn't*; Kutznets, *Towards*.

30 Ruttan, *Induced*, p. 1523.

31 Kuznets, *Towards*. See also Rosenberg, *Historiography*, p. 258.

32 See Cornwall and Cornwall (Export), for details.

nalities which has been given much currency in the classic paper by Alwyn Young. International trade, by widening the extent of the market, increases the scope of the division of labour, helps to overcome indivisibilities in production, and allows for increasing returns.³³ In Solow's basic model these possibilities are assumed away. To the extent that staple exports serve to expand market opportunities for other sectors, they contribute towards increasing productivity in the economy at large, thereby increasing the economy's per capita output. The relationship between trade and economic growth has been given very specific form in what is referred to a Verdoorn's Law, elaborated upon and popularised by Kaldor, which specifies a causal relationship between the growth rate of labour productivity in the economy at large and growth in industrial production.³⁴ This is expressed as:

$$\frac{\dot{Y}}{Y} = m + a\dot{Y}_I \quad (6)$$

where m is an exogenously given rate of technical change, \dot{Y}_I is the growth rate in industrial production, and a is the elasticity of labour productivity growth to industrial output growth. Here, both autonomous technical change and the growth in industrial output 'explain' the growth in labour productivity. The growth in aggregate industrial output is driven by both domestic demand and by exports, inclusive of staple exports. Underlying Verdoorn's Law is the notion that as per capita income increases, an increasing percentage of such increases are spent on non-agricultural products which, in turn, has the effect of increasing productivity and therefore real per capita income.

The Chambers and Gordon challenge

Chambers and Gordon maintain that the arguments for the importance of staple exports to per capita growth suffer from a nebulous theoretical framework and fail to identify clearly the causal mechanism underlying staple theory. They set out to correct this flaw by building a simple neoclassical model to test the proposition that Canada's wheat boom was responsible for most of the increase in Canada's per capita real income during 1901–1911. They ask the counterfactual: what would have transpired 'if all the land that was brought under cultivation between 1901 and 1911 had been impenetrable rock', in other words, if there had been no wheat boom. Using their model, Chambers and Gordon estimate that the wheat boom contributed at most only 8.4 per cent to the increase in Canada's per capita income and probably only 5.2 per cent; or 1.5 per cent of

33 Young, Increasing. See also, Myint, Classical theory.

34 Kaldor, Causes. See Hagemann and Seiter, Verdoorn's; and Thirwall, Plain man's, for a detailed and critical assessment of Verdoorn's Law.

Canada's 1901 per capita gross domestic product. These results, they argue, suggest that a strong correlation between primary product export growth and increases in per capita income is spurious, with most of the per capita income increases attributable to variables other than increases in primary product exports. Thus, policy-makers for presently underdeveloped countries have no good reason to expect much in the way of rising per capita income even with substantive increases in primary-product exports.³⁵ It is important to realise that these rather strong conclusions are not fact-based but are derived from the assumptions which underlie their model, a basic understanding of which helps identify the limits of both the staple theory and the neoclassical critique of this theory.

Chambers and Gordon assume a two sector economy, with a staple (wheat) and a domestic manufacturing (gadgets) sector. Product prices are determined exogenously – Canada is too small a player in the world economy to affect prices. Individuals behave in a manner consistent with profit maximisation: labour is employed in each sector up to the point where the value of its marginal product equals her/his marginal cost (the wage rate). They further assume diminishing returns in agriculture and constant returns in manufacturing and, therefore, no scale economies. Finally, labour supply is assumed to be positively related to the real wage rate, which is set in the gadgets sector. Individuals who cannot find employment or self-employment in agriculture are employed in the gadget sector. Total labour supply is given by labour supply in the wheat and gadgets sectors.

The wheat boom is sparked by some exogenously determined technical change such as the introduction of Red Fife wheat. This shifts wheat's marginal product or the demand for labour curve outward, resulting in the staple sector employing more labour at the old real wage since the marginal product of labour in gadgets is unaffected by events in the wheat sector, yielding the constant real wage. Labour is simply drawn out of the gadget sector and the supply of labour in the wheat sector increases by the amount of the reduction of labour in the gadget sector. What happens to real output or income? Economic rents in the wheat sector increase as wheat's marginal product curve shifts outward and this serves to increase per capita income by the per capita increase in economic rents as it is assumed that population remains unchanged. But Chambers and Gordon argue that it would be incorrect to attribute this increase in income to staple production since, at the same time as Canada was experiencing a boom in staple exports, its gadget industry was also experiencing exogenous shifts in marginal product, completely independent of the wheat boom, due to exogenous technical change.³⁶ The adoption of new technology, for reasons unrelated to the export wheat boom such as an appropriate level of human capital, shifts the marginal product curve in gadgets upward, yielding an increase in the 'equilibrium' real wage rate for the

35 Chambers and Gordon, *Primary*, pp. 316, 317, 320.

36 Chambers and Gordon, *ibid.*, pp. 319, 327.

whole economy.³⁷ Thus, income per capita would have increased through the increase in real wages whether or not there was a staple boom. For this reason, increases in economic rent exaggerates increases in per capita income due to the wheat boom once one nets out the exogenously determined independent effect of technological change on the wage rate.

The core attribute of Chambers and Gordon's critique of the staple hypothesis is simply to assume that those causal connections, which staple theorists deem to be of some importance, are non-existent, yielding their estimate of the overwhelming contribution of exogenous productivity increases in non-staple sectors to Canada increased per capita income during 1901–1911. On the other hand, if one assumes that productivity improvements in the gadget sector were entirely due to incentives unleashed by the wheat boom – that they are endogenously determined – one would conclude that the wheat boom's contribution to the growth in per capita output was 100 per cent. Of course, this is an extreme assumption that yields extreme results: a mirror image of the Chambers and Gordon parable. Such assumptions cannot result in a better understanding of the role played by staples in determining the path of intensive economic growth of any staple-orientated economy. Rather, determining the veracity of the causal assumptions made by staple theorists, discussed above, is at the heart of any determination of the role played by staple exports in intensive economic growth.

Caves finds, for example, that under alternative assumptions the wheat boom contributed 21.4 per cent to per capita income increase during 1901–1911 as opposed to Chambers and Gordon's 8.4 per cent. Caves' revisions are largely attributable to his assumptions about the positive impact that the wheat boom had on labour force participation and employment. He maintains Chambers' and Gordon's assumptions of no economies of scale and exogenous technological change.³⁸ Therefore, Caves' adjustments represent only a lower-bound correction to the Chambers and Gordon estimates. With this said, Caves argues that Canada's growth performance should also be compared to economies with access to similar technological flows as Canada such as the United States. Canada's per capita growth exceeded that of the United States during 1901–1911. The available estimates indicate that real per capita income increased by 22 per cent in Canada and by 15 per cent in the United States during this decade whereas more recent estimates suggest a 45 per cent increase in Canada compared to a 21 per cent increase in the United States.³⁹ On the basis of the most contemporary growth estimates the wheat boom contributed, at a minimum, 59 per cent of Canada's per capita growth – the excess of Canadian over American growth.

37 Chambers and Gordon, *ibid.*, pp. 327–328.

38 Caves, *Export-led*, pp. 417–419.

39 Altman, *Revision*, and, *Revised real*.

THE STAPLE THEORY AND INTENSIVE GROWTH

In terms of one of the basic growth equations discussed above (equation 3), staple exports cause real output per capita to rise if they tend to cause, on average, an increase in the growth of labour productivity and/or in the growth of labour inputs relative to population growth. More specifically, staple theory hypothesises that staple exports positively and differentially affect the rate of technical change, in contrast to neoclassical theory and Chambers and Gordon's variant of it, inclusive of economies of scale, externalities, structural change, and embodied technical change (equation 4). In other words, it is hypothesised that in the absence of staple exports real per capita output would be lower than it would otherwise be. Staple exports could also affect per capita output by influencing the propensity to save in the economy. Staple theory, however, does not specify that staple exports must necessarily have strong effects on the above variables. Much depends on the production function, the degree of freedom available with respect to adopting different organisation forms in producing a particular staple product (a more versus a less equal income distribution and extent of linkages), markets, and the capacity of an economy to realise the full potential afforded by the production of a particular staple. Whether or not the potential of a staple export is fully tapped critically depends on the available social and economic infrastructure. Therefore, two regions producing identical staples may follow quite different paths of development simply as a result of different social and economic infrastructures.⁴⁰ In this sense, the potential intensive growth afforded by staple exports is by no means automatic. The preconditions for realising this potential must be constructed by society's economic agents and private and public organisations. For this very reason, supply-side variables are of vital importance to the staple analytical framework.⁴¹

The most direct means by which a staple economy can achieve a relatively high level of per capita income is when the staple sector is characterised by a higher level of and/or rate of growth in labour productivity than in the non-staple sectors and when staple exports increase the extent to which factor inputs are employed. In this case, staple exports constitute a case of venting for surplus – the staple production simply yields higher returns than do non-staple production.⁴² Staple theory, even in its original form emanating from the pen of Innis, suggests that for this direct effect to be realised, supply-side changes to the economy are required. The economic and social infrastructure must be constructed for the staple to become economically viable. Therefore, staple theory implicitly predicts that this potential direct effect need not be realised if the appropriate supply-side conditions are not met.

40 Schedvin, Staples.

41 North (*Institutions*) emphasises that the market does not and cannot guarantee the development of the necessary infrastructure so that an economy might not realise its maximum economic potential in terms of real per capita output (*ibid.*, p. 9).

42 Caves, Vent; Myint, Classical theory.

Staple theory pays great heed to the potential indirect effects of staple production. It hypothesises linkages between staple exports and non-staple output that result in higher levels of productivity and higher rates of factor employment. Of particular importance, staple theory hypothesises linkages whereby currently employed and new labour is reallocated into relatively more productive growth sectors of the economy, reflected in structural change. Also of importance is the potential significance of increasing returns to scale and externalities made possible by the increasing markets generated by staple exports. Market size grows with both staple-induced increases in immigration and per capita income. Such increases in demand positively feed back into the process of intensive growth.

Staple exports can also increase the rate of growth of per capita income by accelerating the rate of technical change through its affect upon the rate of capital accumulation and, therefore, upon the rate at which best practice technology is embodied in plant and equipment in both staple and non-staple sectors. One cannot simply assume, as Chambers and Gordon do, that technical change occurs independently from the production process. Moreover, because the impact of staples on growth can be an indirect one, simply focusing on its direct impact can yield misleading results. In addition, fiscal linkages emanating from staple production, if productive, improve the efficiency of all sectors, thereby increasing the level of labour productivity and of per capita output.

Finally, for staples to impact positively on the development process requires, as a necessary condition, that foreign markets be relatively open to staple exports or that staple producers are capable of penetrating such markets through cost-cutting measures. In this sense, trade expansion is a necessary condition for the success of a staple-based economy. But this is not the same thing as free trade. The theoretical case favouring staple exports as either a handmaiden or engine of growth depends on the openness of a staple economy to non-staple imports. For the twentieth century, the evidence of a positive relationship between free trade and economic growth is mixed at best and, where positive, the relationship is a weak one.⁴³ In addition, as Bairoch points out, few economies developed outside of what were often significant tariff barriers in the nineteenth and early twentieth centuries, including the rapidly growing United States, Canada, and England. The former two were protectionist nations until the end of World War Two and England dropped its protectionist barriers only after becoming the leading industrial nation in the mid-nineteenth century. Historically, in general, eras of high tariffs tend to coincide with relatively high rates of per capita GDP growth and eras of low tariffs often coincide with low rates of economic growth, albeit this does not demonstrate a causal relationship.⁴⁴ With regards to economic theory, various forms of protection, of a *transitional* nature, are consistent with high rates of economic growth. Such is especially the case for infant industries,

43 See, for example, Edwards, Openness; Rodriguez and Rodrik, Trade policy; Rodrik, Globalization.

44 Bairoch, *Economics*. See also, O'Rourke, Tariffs.

where learning-by-doing can be critically important, that is where it takes time for individuals to learn how to produce efficiently and competitively relative to those economies where industries have established a first-mover advantage.⁴⁵ Temporary protection can, thereby, facilitate the development of linkages derived from staple exports, which, in turn, can serve to increase a staple economy's level of per capita output. On the other hand, protection that hinders staple exports will impede the capacity of staple exports to fuel the growth process. But this constraint can be overcome on the supply-side, if the staple-producing economy has constructed the capacity to reduce production costs sufficiently to meet the challenge of high barriers to staple trade.

A STATISTICAL INTERLUDE

As the Chambers and Gordon intervention underlines, an important point of focus for empirical debates surrounding the staple theory is the Canadian export wheat boom that commenced in the mid-1890s.⁴⁶ For this reason it is important to appreciate the extent to which Canada's export wheat boom was actually correlated with its intensive growth performance and how Canada's growth performance compared with other relatively high income economies, including those countries identified as staple economies by the protagonists in the staple theory debate. Moreover, it is of importance to examine the statistical relationship between the wheat boom and Canada's regional per capita output growth.

I employ Maddison's current dollar per capita gross domestic product estimates to produce annual growth rate estimates for a number of comparable countries including the so-called staple economies during 1870–1929 (Table 1). I supplement Maddison's estimates for Canada, which are based on Urquhart, with Altman's estimates which correct Urquhart's estimates for the deflation problems underlying his numbers.⁴⁷ According to the revised estimates, the Canadian and Argentinean (another wheat exporting nation) growth rates for 1870–1929, 2.2 and 2.0 per cent per annum respectively, were the fastest of all countries, easily

45 See Altman, *Free trade, on infant industries and Arrow, Economic, on learning-by-doing*.

46 In the classic wheat export boom during 1896–1913, the per annum growth rate of wheat exports in 1900 Canadian dollars was 15.5 per cent. In the preceding 26 years, which followed the creation of Canada in 1867, the growth rate was only 2.8 per cent. From 1913 to 1929 it was 8.2 per cent. Within the 1896–1913 time-frame there was some variation in growth, but not much, 14 per cent from 1896 to 1907 and 16 per cent from 1907 to 1913 (derived from, Urquhart and Buckley, *Historical series* L98, L139, L145). On the underlying causes of the wheat boom see, for example, Buckley (*Capital*), Dick (Canadian wheat), Emery and McKenzie (*Damned*), Fowke (*National Policy*), Harley (Transportation), Lewis (Farm Settlement), Mackintosh (*Economic*), Meier (Economic development), Norrie (Rate), and Ward (Farming). On some important empirical issues surrounding the Canadian boom and its impact on the Canadian economy see Altman (Revision, Revised Real, Quantitative), Green and Urquhart (New), Inwood and Stengos (Discontinuities), Sparks and Green (Population Growth) and Urquhart (New, *Gross*).

47 Altman, Revised Real; Maddison, *Monitoring*; Urquhart, *Gross*.

Table 1. International comparisons of levels and growth of per capita GDP, 1870–1929

	Argentina	Australia	Revised Canada	New Zealand	France	Germany	UK	USA
<i>A. Per capita GDP (1990 Geary-Khamis dollars)</i>								
1870	1,311	3,801	1,438	3,115	1,858	1,913	3,263	2,457
1880	na	4,590	1,662	3,765	2,100	2,078	3,556	3,193
1890	2,152	4,775	2,226	3,774	2,354	2,539	4,099	3,396
1896	na	3,947	2,068	4,008	2,660	2,872	4,345	3,509
1900	2,756	4,299	2,756	4,320	2,849	3,134	4,593	4,096
1910	3,822	5,581	3,992	5,343	2,937	3,527	4,715	4,970
1913	3,797	5,505	4,551	5,178	3,452	3,833	5,032	5,307
1925	3,919	5,712	4,396	5,318	4,127	3,772	4,912	6,290
1929	4,367	5,095	5,255	5,289	4,666	4,335	5,255	6,907
<i>B. Per capita GDP growth rates (annual averages)</i>								
1870–80	na	1.90%	1.45%	1.91%	1.23%	0.83%	0.86%	2.65%
1880–90	na	0.40%	2.96%	0.02%	1.15%	2.02%	1.43%	0.62%
1890–1900	2.50%	–1.04%	2.16%	1.36%	1.93%	2.13%	1.14%	1.89%
1900–10	3.32%	2.64%	3.78%	2.15%	0.30%	1.19%	0.26%	1.95%
1896–1913	na	1.98%	4.75%	1.52%	1.54%	1.71%	0.87%	2.46%
1913–29	0.88%	–0.48%	0.90%	0.13%	1.90%	0.77%	0.27%	1.66%
1870–1900	2.51%	0.41%	2.19%	1.10%	1.44%	1.66%	1.15%	1.72%
1870–96	na	0.15%	1.41%	0.97%	1.39%	1.58%	1.11%	1.38%
1900–29	2.47%	0.22%	3.01%	1.17%	2.39%	1.86%	0.86%	2.48%
1896–1929	na	0.78%	2.87%	0.84%	1.72%	1.26%	0.58%	2.07%
1870–1929	2.06%	0.50%	2.22%	0.90%	1.57%	1.40%	0.81%	1.77%

Table 1. continued

	Argentina	Australia	Revised Canada	New Zealand	France	Germany	UK	USA
<i>C. Per capita GDP index numbers (1870 = 100)</i>								
1870	100	100	100	100	100	100	100	100
1880	na	121	116	121	113	109	109	130
1890	164	126	155	121	127	133	126	138
1896	na	104	144	129	143	150	133	143
1900	210	113	192	139	153	164	141	167
1910	292	147	278	172	158	184	144	202
1913	290	145	316	166	186	200	154	216
1925	299	150	306	171	222	197	151	256
1929	333	134	365	170	251	227	161	281
<i>D. Per capita GDP index numbers (Canada = 100)</i>								
1870	91	264	100	217	129	133	227	171
1880	na	276	100	227	126	125	214	192
1890	97	215	100	170	106	114	184	153
1896	na	191	100	194	129	139	210	170
1900	100	156	100	157	103	114	167	149
1910	96	140	100	134	74	88	118	125
1913	83	121	100	114	76	84	111	117
1925	89	130	100	121	94	86	112	143
1929	83	97	100	101	89	82	100	131

Sources: All output estimates except for the new Canada and the Firestone estimates are from Maddison *Monitoring* Tables D1-a and D1-d. The new Canada output estimates are derived from Altman Revised Table 1.

bettering the second best American growth rate. But the low growth rates of the other staple countries, Australia and New Zealand, only compare to the laggard growth performance of the United Kingdom. Growth rates in both Germany and France stood behind the American. During this period, Canadian and Argentinean per capita GDP more than tripled while the Australian per capita GDP increased by less than 50 per cent and New Zealand fared only somewhat better than Australia. In contrast, American per capita GDP increased by 150 per cent.

Canada's most forceful growth performance took place during 1896–1913, at the height of the wheat boom, with per capita GDP increasing by almost 5 per cent per year, during which time wheat exports grew by 15 per cent per year.⁴⁸ Only Argentina's growth performance came close to the Canadian. The American per capita growth rate, Cave's point of reference, was only 2.5 per cent. Before 1896, prior to the wheat boom, Canada's growth record was certainly no better than the Argentinean, American, French, and German. It was especially during 1896–1913 that Canada was able to either significantly catch-up with other countries or pass them by. By 1929, only the United States remained ahead of Canada in terms of per capita GDP, and this by 31 per cent as compared to 70 per cent in 1896 (Table 1). Staple-producing Australia and New Zealand lost the large lead that they held over Canada in 1870, as did the well-established European economies. A key question for the staple theory to address is the great dispersion in economic performance amongst staple producing regions and between staple and non-staple regions.

Canada's regional growth record sheds some insight on the direct and indirect effects of staple production on real per capita GDP growth (Table 2). However you cut it, compared to the Canadian average, only the non-staple producing provinces of Quebec and Ontario, with the bulk of Canada's population (about 60 per cent in the 1920s), witnessed an improvement in their relative positions. In terms of per capita GDP, British Columbia, whose share of Canada's population increased to 7 per cent by 1931, remained Canada's lead province, although its relative position deteriorated sharply from 1891. The Atlantic provinces witnessed a relative decline, as did Canada's two leading wheat-producing regions, Manitoba and Saskatchewan. However, all of Canada's provinces saw some growth, with Manitoba's and Saskatchewan's per capita output increasing by about 80 per cent from 1891 to 1929, while Quebec's and Ontario's almost tripled.

One can discern these regional patterns from a different vantage point when provincial per capita GDP is ranked along side of the already discussed national economies. It is clear how well the economies of British Columbia and Ontario

48 McInnis (Canadian economic) argues against the hypothesis that the wheat boom played an important role driving Canadian growth because he concludes that the bulk of intensive Canadian economic growth took place during 1896–1907, just prior to what he refers to the 'real wheat boom' of 1907–1913. However, there was little difference in the growth of wheat exports during 1896–1907 and 1907–1913 (note 46).

Table 2. The Canadian provinces in an international context: per capita GDP and rankings 1891–1929

	1891	Ranking	1911	Ranking	1929	Ranking
<i>A. Per capita GDP (1990 Geary-Khamis dollars)</i>						
British Columbia	3,616	4	5,951	1	7,091	1
USA	3,396	5	4,970	4	6,907	2
Ontario	2,483	8	4,691	6	6,208	3
Canada (revised)	2,226	11	4,394	7	6,122	4
New Zealand	3,774	3	5,343	3	5,289	5
UK	4,099	2	4,715	5	5,255	6
Alberta	na	na	3,730	10	5,133	7
Australia	4,775	1	5,581	2	5,095	8
Quebec	1,882	15	3,320	13	4,940	9
Manitoba	2,764	6	4,069	8	4,820	10
France	2,354	10	2,937	16	4,666	11
Argentina	2,152	12	3,822	9	4,367	12
Germany	2,539	7	3,527	11	4,335	13
Saskatchewan	2,420	9	3,482	12	4,015	14
Nova Scotia	1,907	14	3,244	14	3,567	15
New Brunswick	2,046	13	3,009	15	2,961	16
Prince Edward Island	1,737	16	2,353	17	2,488	17
<i>B. Per capita index numbers (Canada = 100)</i>						
British Columbia	162		135		116	
USA	153		113		113	
Ontario	112		107		101	
Canada (revised)	100		100		100	
New Zealand	170		122		86	
UK	184		107		86	
Alberta	na		85		84	
Australia	215		127		83	
Quebec	85		76		81	
Manitoba	124		93		79	
France	106		67		76	
Argentina	97		87		71	
Germany	114		80		71	
Saskatchewan	109		79		66	
Nova Scotia	86		74		58	
New Brunswick	92		68		48	
Prince Edward Island	78		54		41	

Sources: See Table 1 Canadian provincial estimates from Green *Regional Appendices*.

fares, with British Columbia moving ahead of the United States by 1911, while Ontario, and Canada as a whole, improved their ranking, moving in behind the United States. Australia and New Zealand remained ahead of the USA, but behind British Columbia. Further back were Quebec and also Alberta, Manitoba, and Saskatchewan (the three primary wheat-producing regions). By 1929,

Saskatchewan and Canada's Atlantic provinces found themselves at the bottom of our sample of regions and countries, while Manitoba was steadily moving towards the bottom tier. Moreover, Manitoba's and Saskatchewan's per capita income was falling relative to Canada (Table 2). Of the wheat-producing regions, only Alberta held its own. To the extent that the wheat export boom positively affected Canada's growth performance, its impact was seemingly biased heavily in favour of the non-staple producing regions of the country. In this case, the indirect effects of staple exports must have been pervasive.

The notion that staple exports was the handmaiden of Canadian growth through its direct and indirect supply and demand side-effects on Canadian development was provided by W.A. Mackintosh, in his classic study of Canadian economic development originally published in 1939. He wrote:

The most fundamental single characteristic of the period [1895–1920, MA] was a high rate of investment induced by improved expectations of profit from the exploitation of natural resources, which had been newly discovered, newly tapped by the extending railways, subjected to new productive techniques, or converted into profit possibilities by favourable shifts in costs and prices. Overwhelmingly most important were the wheat lands of the Prairie Provinces. Prospective profitableness in the exploiting industries created markets for other industries and for a time investment fed on itself . . . the investments of the great expansion had built up a greatly magnified exporting economy in which exporting regions were more specialized than formerly and provided larger markets for imports or the products of other regions . . . Wheat was not merely the largest export and the product of a new region, it was the central dynamic and unifying force of the expansion. The fortunes of regions with declining exports depended on their ability to share in the home market, to integrate themselves with the expanding export region.⁴⁹

CONCLUSION

In the ideal staple scenario, staple exports generate all of the direct and indirect benefits, in terms of higher per capita output, that can possibly be derived from a particular staple. But this ideal need not be realised. Proof of the usefulness of the staple theory is not contained, however, in a successful staple experience. Nor should divergent economic performances by erstwhile staple economies be taken as proof of failure of staple theory. Rather, staple theory provides a framework for analyzing the impact staple exports have on the economic evolution of a country by locating potential causal relationships on *both the demand and supply-side* between exports and intensive growth. This impact might very well be of a differential nature either because a staple-producing region fails to realise its potential or because of the differential nature of the staples produced. Moreover, staple

49 Mackintosh, *Economic*, p. 47.

theory emphasises the importance of supply-side changes, over which economic agents have some control, in affecting the growth process, given that the demand for staple products is often exogenously determined. Thus staple theory points to the capacity of individuals and society to significantly affect the course of economic development.

The potential causal relationships between exports and economic growth are soundly grounded in economic theory. Also they are not ruled out of order by the basic Solow growth model which simply serves to identify the likely sources of sustained economic growth, leaving key variables, such as technical change, unexplained. However, in their application of this model, Chambers and Gordon assume away such causal relationships *a priori*. Any correlation between staple exports and intensive economic growth is assumed to be of a spurious nature and the long-term path of intensive growth is therefore unaffected by trend movements in staple exports. Staple theory, on the other hand, demands that we determine the direct and indirect sources of technical change and other sources of productivity growth. Overall, the staple theory provides a useful framework for analyzing the growth process in countries, such as Canada, the United States, Australia, Argentina, and New Zealand, where traditional staple exports have played a prominent part in their history. Moreover, as North (1955) suggests, the staple framework can also be exploited, as a more general theory of export-led growth, to determine the importance of non-agricultural or raw material-based exports to the process of intensive economic growth.

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