

Working Paper No. 55/00

# **Market Integration in the North and Baltic Seas, 1500-1800**

**David Jacks**

© David Jacks  
Department of Economic History  
London School of Economics

2000



## I. INTRODUCTION

Ever since the time of Adam Smith, the attribution to foreign trade of the ability to affect the wholesale transformation of the productive powers of an economy has remained a very powerful concept in both economics and economic history. At the heart of this interpretation is the observation that improvements in productivity are generated by the expansion of trade through the spreading of fixed costs and an increasing international division of labour.

More recently, this so-called Smithian growth process has fallen under the rubric of market integration, the conversion of discrete and autonomous markets into an interdependent and unified whole. This concept of market integration is particularly relevant to the early modern era in Europe, in that the role of technological innovation in the growth process was severely circumscribed, leaving the expansion and intensification of trade as the only route to sustained productivity and output growth.

Many previous observers on early modern Europe, indeed, found signs of burgeoning market integration – albeit without necessarily adducing to it any profound influence on economic activity.<sup>1</sup> However, more recently, there have been some calls for reevaluation of both the degree and evolution of market integration in early modern Europe. In this view, the apparent movement towards more highly integrated markets was simply that – apparent; data drawn from almost the entirety of Europe seem to bear no signs of inherent or even appreciable market integration in that significant price differentials appear to persist throughout the early modern age.<sup>2</sup>

---

<sup>1</sup> Cf. W. Abel, *Agrarkrisen und Agrarkonjunktur*, (Berlin, 1935) 106-114; W. Achilles, 'Getreidepreise und Getreidehandelsbeziehungen Europäischer Räume in 16. und 17. Jahrhundert,' *Zeitschrift für Agrargeschichte und Agrarsoziologie*, 7 (1959), 32-55; F.P. Braudel and F. Spooner, 'Prices in Europe from 1450 to 1750,' in *The Cambridge Economic History of Europe*, Vol. IV, eds. Rich and Wilson, (Cambridge, 1967) 395-438; and finally, C. Reuter, *Ostseehandel und Landwirtschaft im Sechzehnten und Siebzehnten Jahrhundert*, (Berlin, 1912) 1-34.

<sup>2</sup> R.C. Allen, 'The Great Divergence: Wages and Prices in Europe from the Middle Ages to the First World War,' University of British Columbia Department of Economics Discussion Paper 98-12, 20-4; R.C. Allen and R.W. Unger, 'The Depth and Breadth of the Market for Polish Grain, 1500-1800,' in *Baltic Affairs: Relations between the Netherlands and North-Eastern Europe, 1500-1800*, eds. Lemmink and van Koningsbrugge, (Nijmegen, 1990) 8, 11-2, 15-6; R.W. Unger, 'Integration of Baltic and Low Countries *The Interactions of Amsterdam and Antwerp with the Baltic Region, 1400-1800*, ed. J.M. van Winter, (Leiden, 1983) 7-10; R.W. Unger, 'Illusory Integration: Regional, National and International Markets in Northern Europe, 1300-1900,' London School of Economics Workshop Paper, 8-16; for a similar and much earlier statement of this view, see W. Röpke, *International Economic Disintegration*, (London, 1942) 21-2. The greater part of Allen and Unger's empirical evidence is derived from either the

In so doing, these authors unwittingly commit an error of gross anachronism by reading back into history a view of a pan-European economic system. In disregarding the existence of ‘operative economic regional boundaries’<sup>3</sup> as well as the fact that ‘the existence of different price levels is not inconsistent with a highly developed market,’<sup>4</sup> these revisionists have glossed over possible instances of market integration (cum Smithian growth) and have replaced in their stead an overly static vision of greater Europe.

One of the issues that this paper will attempt to explore is the degree to which one may speak of market integration in the early modern period within such an operative economic region – namely the North and Baltic Seas area. Furthermore, attempts will be made, in turn, to examine the influence of market integration on growth and the determinants of the course of market integration itself. Yet before we can proceed in this direction, a few words must be reserved for the discussion and definition of market integration as a working concept.

## II. DEFINING MARKET INTEGRATION

As the name would imply, market integration may simply be viewed as the opening and development of trade between heretofore autonomous markets and their integration into a single operative entity. Among the manifold definitions explored by Jovanovic, one finds that common to all are the precepts that ‘trade is the quintessence of [market] integration and the division of labour its underlying principle.’<sup>5</sup> Thus, the concept carries with it important implications for structural change within the constituent economies in so far as that the integration of an economy entails ‘tailoring the economic fabric of each economy to the requirements of an [interregional, intranational or] international division of labour.’<sup>6</sup>

Additionally, the theory of market integration in its simplest form is distilled into the so-called law of one price. That is, as inter-market trade commences, any

---

difference or ratio of prices in different localities, and although these measure do possess a simple intuitive appeal, they do little to capture the complex of locational and temporal factors affecting market integration. To be sure, Allen and Unger themselves disparage their use – see R.C. Allen and R.W. Unger, *op. cit.*, 8.

<sup>3</sup> S. Pollard, *Peaceful Conquest*, (Oxford, 1981) 114.

<sup>4</sup> C.W.J. Granger and C.M. Elliott, ‘A Fresh Look at Wheat Prices and Markets in the Eighteenth Century,’ *Economic History Review*, 20 (1967), 258.

<sup>5</sup> M.N. Jovanovic, *International Economic Integration: Limits and Prospects*, 2<sup>nd</sup> Ed., (London, 1998) 9.

<sup>6</sup> F. Machlup, *A History of Thought on Economic Integration*, (London, 1977) 18.

observed differentials in the prices of commodities and services will tend to lessen and eventually disappear, given the absence of any abnormal shocks to the system and the existence of individuals capable and willing to engage in arbitrage. However, the law makes one further very strong assumption, in that the costs of transportation, or more generally, transaction costs are neglected. Therefore, only in a 'wonderland of no dimensions' – i.e. devoid of time and space – would we expect that a single price would be obtaining.<sup>7</sup>

In regards to transactions costs, we will make note of North's definition that they 'are all the costs of human beings interacting with each other. They involve not only the economic costs of making bargains and enforcing contracts and agreements, but also the political costs of devising a framework of rules and enforcement so that bargains can be extended over time and space and therefore allow [one] to capture the gains from trade.'<sup>8</sup> But for all this, the inclusion of transaction costs in the analysis of market integration does not radically alter the situation. Instead of complete equalisation, one now expects a convergence of prices up to the point where the price found in the relatively 'dear' market equals the price found in the relatively 'cheap' market plus the costs of transactions (or  $P_1 = P_2 + t$ ).

The simplicity of the theory of market integration, however, as is often the case, belies the complexity of its empirical manifestation. This has led one noted authority on the subject to despair that 'the difficulty or impossibility of measuring economic integration, or even of suggesting methods of doing it, is embarrassing.'<sup>9</sup> Nevertheless, even given this lack of accepted standards in the measurement of integration, it is believed that assigning an operational definition to market integration inspired by its basic theory and grounding all testing on these criteria may go a long way in averting these problems of measurement.

Specifically, this paper will adapt the definition of integration proposed by Chaudhuri which locates the concept of integration in a three-dimensional place. Firstly, in the amplitude of temporal fluctuations the deviations from an acceptable

---

<sup>7</sup> W. Isard, 'The General Theory of Location and Space-Economy,' in *Location Analysis and General Theory*, (London, 1990) 28.

<sup>8</sup> D.C. North, 'Institutions, Transaction Costs, and the Rise of Merchant Empires,' in *The Political Economy of Merchant Empires*, ed. J.D. Tracy, (Cambridge, 1991) 24.

<sup>9</sup> F. Machlup, 'Conceptual and Causal Relationships in the Theory of Economic Integration in the 20<sup>th</sup> Century,' in *The International Allocation of Economic Activity*, eds. Ohlin et al, (London, 1977) 199.

norm should steadily approach this value, indicating the controlling mechanisms in the system are functioning properly or that they are being improved. If the standard deviations in grain prices for certain years steadily assume lower values, we can say that the structure of cereal production is approaching temporal integration. Secondly, the activities arranged in order of time between two or more points in space should display respectively synchronous movements, a sign of closer relationships between the points. This is taken as geographical integration. Thirdly, if the 'output' generated by different structural systems show increasing joint dependence on one another, we treat this phenomenon as evidence of structural integration.'<sup>10</sup>

By adopting Chaudhuri's conventions, it will be noticed that we have added a criterion apart from the convergence of prices and increasing division of labour not previously considered, that is, the expectation that as markets become increasingly integrated the co-movement in relevant variables will become greater. The reason why this should be so is relatively straightforward: assuming that  $P_1=P_2+t$  as before and that mechanisms exist for maintaining the equality, any movement in, say,  $P_1$  should be reflected in an equal movement in  $P_2$ , provided that  $t$  remains constant.

This being the case, we are now in a position to directly test for market integration in the early modern period, but at the moment, an examination of the nature and provenance of the data is at hand.

### III. THE DATA

The data employed in the current study almost exclusively pertain to the course of basic grain prices, namely rye and wheat, throughout the three hundred years under scrutiny. The motivation for the choice of basic grains is easily located in Braudel and Spooner's typification of grains as 'grown almost everywhere, recorded

<sup>11</sup> So, above all considerations, there is the inescapable fact that they constitute some of the best recorded commodities throughout the ages.

Additionally, for in the region and time period considered, the predominance of wheat and rye culture not only in production and consumption, but also, thereby in

---

<sup>10</sup> K.N. Chaudhuri, 'World Silver Flows and Monetary Factors as a Force of International Economic  
*The Emergence of a World Economy, 1500-1914, Part I*, eds. Fischer et al, (Stuttgart, 1986) 65.

<sup>11</sup> F.P. Braudel and F. Spooner, 'Prices in Europe from 1450 to 1750,' 392.

commerce and trade was heartily felt; Slicher van Bath summarised the situation well with the observation that ‘cereal prices acted as the thermometer of the general

12

As to the construction of the relevant series, the data was, first, compiled from a number of sources which are detailed on a city-by-city basis in Appendix I. Following the tradition set by the price historians, the collection of data was keyed towards determining the values of ‘middling’ quality grains in an effort to control for quality differences over time and space; but admittedly, this is at best a stopgap measure for holding quality constant. At most, what can be hoped for is that any ‘noise’ generated by quality changes will be consistently represented in the individual datum since in the main we are interested in patterns of change and not necessarily precise values of price levels.

Likewise, the very nature of international comparisons of prices makes the recourse to a standard unit absolutely necessary and here the ubiquitous problem of ‘noise’ crops up again. Conversions of weight and volume are relatively easy to deal with. However, the matter of a standard unit of value is especially vexing, both in terms of conversion and of the danger of falling prey to Beveridge’s criticism that ‘to describe silver and gold equivalents as prices is to ignore the nature of money and to confuse barter with exchange by the use of money.’<sup>13</sup> Abiding by this insight to develop a means to overcome the problem of international convertibility, essentially, leaves only one option: obtaining the average spot exchange rates of every currency in every period – an as-to-yet impossibility. In any case, partially putting aside the fulminations of Beveridge and citing the standards of the International Scientific Committee on Price History,<sup>14</sup> conversion to the Dutch *rijksdaalder*, a unit of account fixed at 25.98 grams of silver, as an ‘internationally stable’ currency was deemed to

---

<sup>12</sup> B.H. Slicher van Bath, *Agrarian History of Western Europe*, (London, 1963) 98; it is easily noted – and well-remembered – that the use of grains as a proxy for the prevailing economic climate, indeed, raises some methodological concerns, the chief being the danger of an overvaluation of the level of market integration; barring a more encompassing examination of commodity prices, grain prices remain attractive both in terms of their precedence in previous research and their theoretical applicability to the study of market integration – see A. Marshall, *Principles of Economics*, 6<sup>th</sup> Ed., (London, 1920) 270-3.

<sup>13</sup> W. Beveridge, *Prices and Wages in England*, Vol. I, (London, 1939) XLVIII.

<sup>14</sup> A. Cole and R. Crandall, ‘The International Scientific Committee on Price History,’ *Journal of Economic History*, 24 (1964), 381-8.

Another issue was the determination of which cities to include in the analysis, which was predicated by two factors: the appropriateness of the locality in regards to its importance in the international grain market and the availability of sufficient and reliable data for the period at hand. Essentially, this represented a strong constraint only in regards to the Danzig market. In order to simultaneously calculate continuous measures of market integration and avoid promiscuous interpolation of the price data, it was found necessary to construct an averaged Polish series based on data taken from numerous cities.<sup>17</sup> This is certainly not the handicap one might suppose as soon as it is realised that from early on the Polish urban markets had begun to articulate a 'national price,' or at the least, a 'very great uniformity of prices' based on 'a determinate regional dependence.'<sup>18</sup>

Finally, all prices were subjected to logarithmic transformations in order to, first, act as means of 'smoothing out' the data and, second, to dampen any 'noise'

<sup>15</sup> A. Attman, *Dutch Enterprise in the World Bullion Trade, 1550-1800*, (Uppsala, 1983) 8; and S. Quinn, 'Gold, Silver, and the Glorious Revolution: Arbitrage between Bills of Exchange and Bullion,' *Economic History Review*, 39 (1996), 475.

<sup>16</sup> Quoted in C. Wilson, *Anglo-Dutch Commerce and Finance in the 18<sup>th</sup> Century*, (Cambridge, 1941) 8; additionally, see A. Attman, *The Russian and Polish Markets in International Trade, 1500-1650*, (Gothenborg, 1973) 159; H. Klomp maker, *Handel in De Gouden Eeuw*, (Bussum, 1966) 29-30; and J. Schneider and O. Schwarzer, 'International Rates of Exchange: Structures and Trends of Payments Mechanism in Europe, 17<sup>th</sup> to 19<sup>th</sup> Century,' in *The Emergence of a World Economy 1500-1914*, Part I, ed. Fischer et al, (Stuttgart, 1986) 152, 154-5.

<sup>17</sup> For similar reasons, the Amsterdam series was supplemented in the early 16<sup>th</sup> century to a limited degree – in 41 of the 74 years prior to 1574 – with estimations provided by the following regressions (t-statistics in brackets):

$$\text{For rye, } \log A = .20099 + .26557\log B + .64833\log L + .00006941T$$

$$\quad \quad \quad [3.9681] \quad [6.8277] \quad [14.4716] \quad [.94668]$$

where A equals the price in Amsterdam, B the price in Breda, L the price in Leiden, T a time component, and  $R^2 = .91592$ .

$$\text{For wheat, } \log A = .55573 + .23224\log L + .46787\log U + .0003372T$$

$$\quad \quad \quad [5.9585] \quad [3.9068] \quad [6.8938] \quad [3.8303]$$

where A equals the price in Amsterdam, L the price in Leiden, U the price in Utrecht, T a time component, and  $R^2 = .89125$ .

<sup>18</sup> W. Kula, *An Economic Theory of the Feudal System: Towards a Model of the Polish Economy, 1500-1800*, (London, 1976) 130-1, 163.



generated from matters of product heterogeneity and/or fundamental errors in physical and monetary conversions.

#### **IV. TESTING FOR MARKET INTEGRATION**

##### **IV.A TEMPORAL INTEGRATION**

Following Chaudhuri's formulation of temporal integration as the convergence of deviations towards an acceptable norm, we find that the application of an analysis of coefficients of variation to be the most suitable. In simplest terms, what is expected from increasing market integration is a decrease in the value of the coefficients of variation over time. In this case, the coefficient of variation (standard deviation divided by mean) was calculated for individual years across time and across various trading centres. Additionally, the construction of a benchmark to aid in the determination of the relative degree of integration was thought appropriate; the choice of the wheat trade among Berlin, Chicago, and London in the period from 1875 to 1900 was predicated upon the era's remarkable lack of trade barriers and, hence, high degree of integration, both underwritten by an organizational and institutional technology which is thought to have been, in the main, available to the economies in question.<sup>19</sup>

On pages 50-52, figures 1 through 3 document the course of the coefficients of variation through time. In figure 1, we find the coefficients of variation for rye with the longest continuous series (1500-1800) being that for Amsterdam, Brussels, Köln, and Poland. At successive dates (1684, 1710, and 1732), the data permitted a broadening of the cities under examination to include Copenhagen, London, and Stockholm, respectively. In figure 2, we find the coefficients of variations for wheat with the longest continuous series (1500-1800) now being that for Amsterdam, Brussels, Köln, London, and Poland. Again, additions to the database allowed for the inclusion of Copenhagen, Bremen, Hamburg, and Stockholm at later dates (1684, 1700, and 1736). It must first be noted that the broad concurrence of the individual series within

---

<sup>19</sup> D.C. North, 'Ocean Freight Rates and Economic Development, 1750-1913,' *Journal of Economic History*, 18 (1958), 537-55; and D.C. North, 'Sources of Productivity Change in Ocean Shipping, 1600-1850,' *Journal of Political Economy*, 76 (1968), 953-70; even though North's original thesis regarding the primacy of organisational factors has recently been called into question, this should present no problem to the use of the benchmark in that the inadvertent incorporation of unavailable technological factors should only raise its

the figure for both rye and wheat suggests that the coefficients of variation derived from the longest continuous series may be taken as highly representative of the region as a whole. Secondly, as the number of cities in the two series for rye and wheat differs, the series are not strictly comparable; however, as depicted in figure 3, the correspondence between the two is remarkable. In both cases, we see a dramatic diminution in the coefficients until the period of 1620/40 at which time there is an increase until 1640/70 (eroding around half of the ground made previously) which is, in turn, followed by a gentle downturn into 1800. Perhaps, the most startling observation arising from Figure 3 is the fact that at its global minimum the wheat series attains a value for the coefficient of variation which is less than that attained for the benchmark. The picture that arises from this analysis is that, although market integration did, undoubtedly, suffer from periods of hesitation and even regression which should not be overlooked, the period of 1500 to 1800 was largely one of increasing market integration and that for the period of 1500 to c.1650, this process, as represented by the coefficients of variation, was strongly in effect.

#### IV.B GEOGRAPHICAL INTEGRATION

In contrast to that of temporal integration, the measurement of geographical integration requires a bit more technical sophistication than simple coefficients of variation, in that we are essentially searching for evidence of sympathetic movements in prices in the region. Fortunately, Weir has already developed such a statistic for the extent of price synchronisation across many markets.<sup>20</sup>

---

expected value – see C.K. Harley, ‘Ocean Freight Rates and Productivity, 1740-1913: The Primacy of *Journal of Economic History*, 48 (1988), 851-76.

<sup>20</sup> As Weir writes, ‘the measure described here exploits the fact that the variance of a variable constructed as the mean of several component variables, holding constant the number of components and their variances, will be larger the higher are the correlations among the components’ while ‘the year-to-year variance of the [regional] market will increase...with greater correlation across markets.’ Controlling for the effect of variances in the components, ‘we can form the ratio of the observed variance of the composite [regional] average to the variance expected in the absence of any correlation across regions’ as  $\text{Var}(\text{regional})/(\text{Var}(x)/n)$ , where  $n$  equals the number of component markets. As would also be expected, this ratio will range from one (no correlation) to  $n$  (absolute correlation). Weir continues, ‘to rescale the measure from zero to one, subtract one from the ratio and divide by  $(n-1)$ ...[finally]...estimate  $\text{Var}(x)$  by the average of the local variances.’ We find the statistic, therefore, to take the form:

$$R = \frac{\frac{\text{Var}(\text{regional})}{\sum_i \text{Var}(i) / n^2} - 1}{(n - 1)}$$

Yet again, the construction of a benchmark based on the Berlin-Chicago-London trade was carried out; and as before, on pages 53-55, we find figures 4 through 6 documenting the course of the R-statistics for rye and wheat – calculated on the basis of a centred, moving twenty-five year interval – throughout the period from 1500 to 1800. Taken individually, figures four and five are both suggestive of the fact that the longest continuous series may be again taken as highly representative of the entire region.

This being the case, we can sketch out the broad outlines of the path of price synchronisation as follows: relative stability with general improvement for the period from 1500 to c. 1650 followed by a pronounced drop until c. 1670 which, in turn, was followed by a sharp increase until c. 1700 when the R-statistics lose some ground until c. 1750 when they demonstrate an appreciable rise throughout the last half of the 18<sup>th</sup> Century. This course is in large measure in agreement with the previous analysis of the coefficients of variation, especially in their concurrence on the existence of an appreciable shock to the process of market integration in the period c.1640 to c.1670. Most importantly, the figures on the R-statistics also further the cause of interpreting the entire period as one of greater market integration as evidenced by their favourable performance vis a vis the benchmark statistic.

Finally, it also must be recognised that these figures represent, if anything, the lower bound for geographical integration. This is so because, as stated before, the underlying logic of the use of the R-statistic is based on the assumption that  $P_1=P_2+t$  and that  $t$  remains constant. However, the validity of this last statement, regarding the constancy of  $t$  in all situations, is, of course, highly debatable. To the extent that variation in one price series is perfectly correlated with variation in the transactions costs variable,  $t$ , we would expect the correlation between price series to fall to zero; for instance, the outbreak of war in an area could be expected to raise local prices ( $P_1$ ) as well as costs of transaction and transport ( $t$ ), and if the accompanying rise in  $t$  is great enough, no change in  $P_2$  may occur. Thus, in the context of increased shocks – in extent and/or intensity – to the system and, hence, increased price variance, the value of the R-statistics could fall without the implication of any change in market

---

Consequently, 'the measure can, with some loss of statistical precision be interpreted as the average correlation coefficient across regions;' D. Weir, 'Markets and Mortality in France, 1600-1789,' in *Famine, Disease and the Social Order in Early Modern Society*, eds. Walter and Schofield, (Cambridge, 1989) 206-9.

efficiency or the extent of market integration. This observation when taken into consideration along with the previous analysis is highly suggestive; thus, once again, the interpretation of the early modern period as one of little or no international market integration – as put forward by Allen and Unger – is called into serious question.

#### **IV.C STRUCTURAL INTEGRATION**

As Chaudhuri vaguely defines structural integration as the condition whereby the ‘output’ generated by different structural systems show increasing joint dependence on one another, we find ourselves with no rough and ready means of measurement at hand. However, the amorphousness of the definition does bestow certain advantages.<sup>21</sup>

Firstly, the intentionally open-ended use of ‘output’ allows for the incorporation of variegated concepts into our operational definition; and secondly, the emphasis on joint dependence allows us to take a step back and identify the broader evolutionary patterns of market integration. As such, it is proposed that two separate tests be undertaken: one employing our price data within the structure of a formal model of market integration based on the assumption of commodity price convergence, the other examining the change over time in the region’s urban hierarchy in order to get at the more elusive concept of an increasing international division of labour.

##### **IV.C.i THE RAVALLION MODEL OF MARKET INTEGRATION**

The Ravallion model is based on the search for a dynamic representation of market integration in order to supplant the imprecision and inferential dangers of static measures. Specifically, the task Ravallion sets out for himself is to develop a methodology which ‘can distinguish between the concepts of instantaneous market integration and the less restrictive idea of integration as a long-run target of the short-run dynamic adjustment process,’ for ‘in many settings it will be implausible that trade

---

<sup>21</sup> Although initially appealing, an investigation into the cointegrative properties of the time series was rejected in favour of the model proposed by Ravallion; as Baulch writes, ‘cointegration is an unnecessary condition for market integration because if transfer costs are nonstationary, arbitrage between two markets may be efficient even when their price series are not cointegrated.’ Furthermore, ‘cointegration is an insufficient condition for market integration because two price series may be cointegrated but their price differential may be too small to offset transfer costs. The practical importance of cointegration is not as a test for market integration in its own right but as a pre-test for other econometric tests for market integration.’ B. Baulch, ‘Transfer Costs,

adjusts instantaneously to spatial price differentials, and so one would be reluctant to accept short-run market integration as an equilibrium concept.’ Obviously, this latter condition should be seen as especially true for early modern European history, in that the means of transfer, both in terms of goods and information, were exceedingly slow by present standards. However, ‘given enough time, the short-run adjustments might exhibit a pattern which converges to such an equilibrium;’ furthermore, in the case that ‘short-run integration is rejected, then it would be nice to know if there is any long-run tendency toward market integration.’<sup>22</sup>

The model that Ravallion proposes explicitly assumes certain characteristics about spatial market structure. Firstly, it is assumed that there exist a number of localised markets and a single central market. Secondly, it is assumed that while trade does take place among the localised markets, it is trade with the central market that dominates local price formation. Additionally, so as not prejudice the outcome, Ravallion proposes incorporating alternative hypotheses regarding market integration in such a way as to allow for their nesting within a more general model. The resulting structural form of the model is represented by:

$$(1) P_{1t} = \sum_{j=1}^n a_{1j}P_{1t-j} + \sum_{k=2}^N \sum_{j=0}^n b_{k1j}P_{kt-j} + X_{1t}C_1 + e_{1t} \text{ for the central market and}$$

$$(2) P_{it} = \sum_{j=1}^n a_{ij}P_{it-j} + \sum_{j=0}^n b_{ij}P_{1t-j} + X_{it}C_i + e_{it} \text{ for the localised markets,}$$

where  $P_{1t}$  is the price in the central market in time  $t$ ,  $P_{1t-j}$  is the price in the central market in time  $t-j$ ,  $P_{kt-j}$  (or  $P_{it-j}$  in (2)) is the price in localised market  $k$  (or  $i$ ) in time  $t-j$ ,  $X_{1t}$  is a vector of other influences on the central market,  $P_{it}$  is the price in localised market  $i$  in time  $t$ , and  $X_{it}$  is a vector of other influences on localised market  $i$ . In this way, prices in the central market are determined by past values in the central market and all localised markets and concurrent values in the localised markets while prices in the localised markets are determined by past values in the central and respective localised markets and concurrent values in the central market.

---

Spatial Arbitrage, and Testing for Food Market Integration,’ *American Journal of Agricultural Economics*, 79 (1997), 477-87.

<sup>22</sup> M. Ravallion, ‘Testing Market Integration,’ *American Journal of Agricultural Economics*, 68 (1986), 102-9.

As such, a few points are worth mentioning. First, since our concern lies with the transmission mechanisms evident in the greater economy and not with the structure of price formation within the central market, we can safely disregard the first equation for now. Second, the appropriate hypotheses to be entertained are those of short-run market integration (whereby  $b_{i0}=1$  and a price increase in the central market will be immediately passed on in the localised market) and long-run market integration (whereby  $\sum a_{ij} + \sum b_{ij} = 1$  and the short-run process of price adjustment described by the model is consistent with an equilibrium in which a unit increase in the central price is passed on fully in localised prices).

In aligning this model with received historical wisdom, we may begin with the observation that throughout this period, certain cities in our study (notably Amsterdam and London) played a crucial role as commercial entrepôts and that incumbent upon these roles was a corresponding part in price formation across the region.<sup>23</sup>

From the end of the 14<sup>th</sup> Century, the influence of the Dutch/Flemish towns – and with time, especially of Amsterdam – transmitted powerful signals to the markets of England, Denmark, Sweden, Germany, Poland, and the Baltic states alike.<sup>24</sup> This process culminated in the late 17<sup>th</sup>/early 18<sup>th</sup> century; for which time, Henri Sée could write, ‘Amsterdam est toujours le grand marché...les prix de cette place...s’imposent aux autres places de commerce [Amsterdam is always the great market...the prices of this market...are essential to other centres of commerce.]’<sup>25</sup>

However, the theme of the eventual ascendancy of London over Amsterdam has long been a popular one in the economic history of early modern Europe with most pundits dating the transfer sometime in the later half of the 17<sup>th</sup> century;<sup>26</sup> yet there has been as-of-yet little quantitative evidence for this. Tests on the vector autoregression of the five time series of wheat – based on the Granger representation

---

<sup>23</sup> V. Barbour, *Capitalism in Amsterdam in the 17<sup>th</sup> Century*, (Baltimore, 1950) 20; and C. Cipolla, *Before the Industrial Revolution: European Society and Economy, 1000-1700*, 2<sup>nd</sup> ed., (London, 1981) 268.

<sup>24</sup> P. Gunst, ‘Agrarian Systems of Central and Eastern Europe,’ in *The Origins of Backwardness in Eastern Europe*, ed. D. Chirot, (London, 1989) 62; and M. Tits-Dieuaide, ‘The Baltic Grain Trade and Cereal Prices’ *The Baltic Grain Trade*, ed. W. Minchinton, (Exeter, 1985)

12.

<sup>25</sup> Quoted in J.G. van Dillen, ‘Economic Fluctuations and Trade in the Netherlands, 1650-1750,’ in *Essays in European Economic History, 1500-1800*, ed. P. Earle, (Oxford, 1974) 204.

<sup>26</sup> J.I. Israel, *Dutch Primacy in World Trade, 1585-1740*, (Oxford, 1989) 292-358; and I. Wallerstein, *The Modern World System, II: Mercantilism and the Consolidation of the European World-Economy, 1600-1750*, (London, 1980) 3-9.

theorem<sup>27</sup> – were carried out which show clear statistical corroboration for the thesis of Amsterdam’s hegemony up until 1650 followed by a period wherein neither Amsterdam nor London can be assuredly placed as the hegemonic economic power. Therefore, the Ravallion model was run from 1650 with both Amsterdam and London as the reference market, for continuing to base the model on the sole hegemony of Amsterdam could lead to biased results.

Finally, due to *a priori* considerations of collinearity, an error correction mechanism was opted for in the estimation of equation (2), taking the form of:

$$(3) \Delta P_{it} = (a_i - 1)(P_{it-1} - P_{1t-1}) + b_{io}\Delta P_{1t} + (a_i + b_{io} + b_{i1} - 1)R_{t-1} + cnt + e_{it} ,$$

where the dependent variable equals the change in price in the i-th market in time t, the first regressor equals the difference between the price in the i-th market in time t-1 and the price in the reference market in time t-1, the second regressor equals the change in price in the reference market in time t, the third regressor equals the lagged value of the reference market price, *cnt* equals a constant, and  $e_{it}$  represents the error term.<sup>28</sup> Full details of the

results of the regressions are reported in Appendix II; for the purpose at hand, however, table 1 (page 59) is sufficient. Here, we find the results of the market integration regressions concerning the two previously mentioned hypotheses of short-run and long-run integration.

Referring to table 1, the measures for short-run integration are presented under the various designations for  $b_{io}$  (e.g.  $b_{bo}$  for Brussels) while those for long-run integration are presented under the various designations for  $\Sigma a_{ij} + \Sigma b_{ij}$  (e.g.  $a_b + b_{bo} + b_{b1}$  for Brussels); stated once again, the attainment of unity in the measures fulfils the condition for perfect integration, whether short-run or long-run. What immediately emerges from table 1 is the remarkable degree of long-run market integration evident for the entire period and region under consideration; the average deviation from unity is a mere 3 per cent, pointing to the inescapable fact that strong forces towards greater integration were indeed at work in this period. What is more, we see that the

<sup>27</sup> R.F. Engle and C.W.J. Granger, ‘Co-Integration and Error Correction: Representation, Estimation, and *Econometrica*, 55 (1987), 257-9.

<sup>28</sup> *A posteriori*, the use of an error correction mechanism also allowed for superior performance on the basis of the Chow and predictive failure tests as well as in consideration of heteroskedasticity; this finding is in agreement with previous research which likewise found an error correction mechanism to be superior to

nature of market integration was not only quantitatively but also qualitatively changing at this time, for we see in all of the series a strong rise in the level of short-run integration, suggesting that the international market was functioning more efficiently through time. Additionally, the comparison of results obtaining from Amsterdam and London as the respective reference markets does lend much credence to the dating of the eclipse of Amsterdam by London sometime around 1650-1700 as we see both the measures of short-run and long-run integration based on London leadership make considerable gains on those calculated for Amsterdam – most notably in the Brussels and Köln markets. Finally, figures 7 and 8 (pages 56 & 57), which represent the fifty year averages of overlapping measurements of long-run integration, also point to a significant disturbance in the process of market integration dating from the mid-seventeenth century.

#### **IV.C.ii THE RANK-SIZE DISTRIBUTION OF THE BALTIC-NORTH SEAS**

As of yet, our investigation has been concentrated on delineating the form and evolution of only one facet of market integration, namely commodity price convergence; however, as defined previously, market integration is also expected to incorporate yet another process, a greater international division of labour. As the definition and measurement of the empirical manifestation of an international division of labour poses serious problems for even modern researchers,<sup>29</sup> its study in the early modern period must necessarily be seen as even more troublesome.

Yet, in recent years, there has arisen at least one analytical tool which will allow us at least a shorthand description of the evolution of the international division of labour. This tool is that of the analysis of rank-size distribution of cities. Following the lead set by geographers and planners in the 1940s and 1950s, a number of economic historians – most notably Jan de Vries – have adapted their work to studies of the early modern world.<sup>30</sup> The basic element in this toolkit being the lognormal distribution used to describe the size distribution of cities, which is represented by a rank-size distribution as:

---

Ravallion's original formulation – see C. Alexander and J. Wyeth, 'Cointegration and Market Integration,' *Journal of Development Studies*, 30 (1994), 303-28.

<sup>29</sup> *The International Division of Labour: Problems and Perspectives*, ed. H. Giersch, (Tübingen, 1974).

<sup>30</sup> J. de Vries, *European Urbanization, 1500-1800*, (London, 1984) 85-95.



$$(1) P = K(R)^{-q},$$

where P is the size of the city, R the rank of the city, and q and K are constants. This is further transformed for computational purposes to:

$$(2) \log P = \log K - q(\log R).$$

Additionally, the rank-size distribution is believed to take a very specific form in highly integrated economies.<sup>31</sup> This is the so-called rank-size rule, whereby the population of a city with rank R equals the population of the largest city divided by its rank. In its graphical representation, the rank-size rule manifests itself as a log-normal distribution with a slope of negative one.

The rank-size distribution gains its merit for our study if we allow for the interpretation of urbanisation as not only a concentration of population but also a concentration of activities and functions.<sup>32</sup> Therefore, as the rank-size distribution approaches the form postulated by the rank-size rule, we may take this as prima facie evidence of greater market integration cum an increasing international division of labour.

This being the case, the application to the Baltic-North Seas region is relatively straightforward. The geographical delineation of the region was roughly taken as the quadrilateral formed by London, Brussels, Danzig, and Stockholm augmented by a scattering of cities along the eastern English coast and the Norwegian coast. Additionally, only those cities immediately on or within fifty kilometres by navigable waterway of the sea coasts were included to ensure a rough parity of treatment while all population data was taken from two sources, either *European Urbanization* or *Urbanization in History*.<sup>33</sup>

Figure 9 (page 58) is the graphical representation of the rank-size distributions for every fifty years between 1500 and 1800. In it, we see first that the region as of 1500 is consistent with de Vries' interpretation of a medieval urban system in which 'the summation of many relatively autarkic urban systems' generates 'a flat-topped

---

<sup>31</sup> C.A. Smith, 'Regional Economic Systems: Linking Geographical Models and Socioeconomic Problems,' in *Regional Analysis, Vol. I: Economic Systems*, ed. C.A. Smith, (London, 1976) 29-30.

<sup>32</sup> *Ibid.*, 12; and C.A. Smith, 'Types of City-Size Distributions: A Comparative Analysis,' in *Urbanization in History: A Process of Dynamic Interactions*, eds. van der Woude et al, (Oxford, 1990) 28-9.

<sup>33</sup> *Urbanization in History: A Process of Dynamic Interactions*, eds. van der Woude et al, (Oxford, 1990); and J. de Vries, *European Urbanization, 1500-1800*, (London, 1984).

curve with a [relatively] shallow slope.’<sup>34</sup> This distribution of 1500 is then seen to be succeeded by a rapid loss of the so-called medieval flat top by 1600 at the latest, suggesting a movement towards greater interregional integration. This situation is, in turn, followed by a period wherein the basic form of the rank-size distribution obtaining in 1800 has taken shape by 1650. Indeed, at this point, the many strands of the graphical analysis becomes somewhat convoluted, making recourse to another form of representation desirable.

As de Vries once again notes, ‘rank-size distributions are a product of empirical investigation and it seems wise to continue to insist that their use be empirically based...regression [of rank on size] over the bulk of the cities of the urban system [should be held as] the preferred method because it makes a minimum of assumptions about the appropriate shape of the distribution and permits differences among them to be viewed unobstructed by a filter of abstract standards.’<sup>35</sup> With this injunction in mind, such regressions were run, with the results reported in table 2 (page 59).

In table 2, we see clear evidence of greater market integration through time by noting

the coefficients associated with the logarithm of city size (denoted log S). As has been mentioned previously, the movement towards unity in these coefficients may be taken as an indication of more pronounced functional differentiation and market integration among cities. This progress in attaining the so-called rank-size rule is further highlighted in table 2 by the figures in the right-hand column which represent the absolute difference between the coefficient for log S and unity for the respective years. These figures clearly map out that the region was progressing towards the articulation of a coherent and integrated economic system based on an increasingly great international division of labour.

#### **IV.D CONCLUSIONS FROM THE TESTS FOR MARKET INTEGRATION**

---

<sup>34</sup> J. de Vries, ‘Patterns of Urbanization in Pre-industrial Europe, 1500-1800,’ in *Patterns of European Urbanization since 1500*, ed. H. Schmal, (London, 1981) 93.

<sup>35</sup> J. de Vries, *European Urbanization*, 93.

As should be clear, the view of the early modern period as one of increasing market integration and economic interdependence among nations is still entirely valid – given a reasonable demarcation of the economic units involved. Interpretations which would have us hold that economic integration is ‘a relatively recent phenomenon’ are clearly untenable.<sup>36</sup> This fault arises from a lamentable admixture of confused economic boundaries, a general lack of operative criteria for market integration, and an undue reliance on simplistic statistical analysis.

It should be made clear that what is being argued here is not that the entirety of Europe had become engrossed in a complete and overarching system of markets, but rather that certain regions within the continent were becoming more highly integrated within themselves and perhaps among one another. This observation has been clearly borne out by the amassed statistical evidence; on all four counts of testing, the Baltic-North Seas region unarguably demonstrate a progression towards greater market integration. Likewise, the results emerging from the four tests tell a story of relatively high initial integration followed by some improvement in the situation until the midpoint, c.1650, at which time the system suffered a strong shock which was to be followed by the final period in which the process of market integration showed no evident signs of regression or even of slowing down.

Necessarily, we would expect that such a strong movement towards greater economic unity would generate analogously strong effects in the constituent economies. In what follows, an attempt will be made to place this process of market integration within the context of the early modern economy, namely by examining how market integration shaped and was shaped by the wider institutional economic setting.

## **V. THE MEANING OF MARKET INTEGRATION FOR THE EARLY MODERN EUROPEAN ECONOMY**

Although perhaps decisive in an astonishingly wide range of early modern processes (e.g. the maintenance of public order, the pattern of famine, and even the transmission of disease),<sup>37</sup> market integration was to have its greatest and most

---

<sup>36</sup> R.W. Unger, ‘Illusory Integration,’ 16.

<sup>37</sup> Cf. C. Tilly, ‘Food Supply and Public Order in Modern Europe,’ in *The Formation of National States in Western Europe*, ed. C. Tilly, (Princeton, 1975) 392-6; J. Walter, ‘The Social Economy of Dearth in Early Modern England,’ 81-94, and J. Walter and R. Schofield, ‘Famine, Disease and Crisis Mortality in Early

fundamental impact upon the structure and level of activity in the early modern economy.

This impact was, of course, delineated in its broad form by Adam Smith over two hundred years ago. It is telling that Smith opened his magnum opus with the statement that ‘the greatest improvement in the productive powers of labour, and the greater part of the skill, dexterity, and judgement with which it as any where directed, or applied, seem to have been the effects of the division of labour.’<sup>38</sup> In this way, the role of the division of labour as more than ‘a quaint practice of 18<sup>th</sup> century pin factories’ but rather as ‘a fundamental principle of economic organisation’ was forcefully asserted.<sup>39</sup> The underlying logic for this assertion was, in turn, based on the observation that the returns to the time devoted to a productive activity are necessarily greater when those involved are permitted to specialise in that activity rather than have their efforts, attentions, and thoughts dissipated by generalised production.<sup>40</sup>

Furthermore, in explaining the degree of the penetration of the division of labour, Smith wrote that ‘as it is the power of exchanging that gives occasion to the division of labour, so the extent of this division must always be limited by the extent of that power, or, in other words, by the extent of the market.’<sup>41</sup> Thus, with the seemingly innocuous dictum that ‘the extent of the market determines the division of labour,’ Smith concisely summarised Europe’s entire experience with growth in the pre-industrial age.<sup>42</sup> This conclusion necessarily follows from the assumption that market integration – via its transmission of strong price signals and, hence, its implicit effect on opportunity costs over vastly distant geographical regions – allowed for the effective specialisation of function (and the attendant benefits therein) to take place.

What is proposed for the remainder of this section is an investigation of precisely how specialisation, induced by the workings of market integration, allowed for significant increases in economic output in certain sectors of the early modern age.

---

Modern Society,’ 66-7, in *Famine, Disease and the Social Order in Early Modern Society*, eds. J. Walter and R. Schofield, (Cambridge, 1989).

<sup>38</sup> A. Smith, *Inquiry into the Nature and Causes of the Wealth of Nations*, Vol. I, ed. E Cannan, (London, 1961) 7.

<sup>39</sup> G.J. Stigler, ‘The Division of Labour is Limited by the Extent of the Market,’ *Journal of Political Economy*, 59 (1951), 193.

<sup>40</sup> A. Smith, *op. cit.*, 11-4.

<sup>41</sup> *Ibid.*, 21.

<sup>42</sup> W.N. Parker, ‘European Development in Millennial Perspective,’ in *Economics in the Long View*, ed. Kindleberger and di Tella, (London, 1982) 1-7.

However, the problem of measurement arises yet again in that what we seek is some indication of 'the growth...in the (hard-to-measure) volume of trade between regions, directed along the lines of (hard-to-measure) differences in opportunity costs in each region, leading to increase in (impossible-to-measure) total output, without the necessity of aggregate additions to land, labour, or capital, or of new techniques.'<sup>43</sup> Necessarily then, much of the evidence adduced for this growth in productivity and output will have to take a more qualitative form than that in previous sections, yet this, of course, cannot be taken as an indication of a less rigorous exposition.

## V.A. INDUSTRY AND MANUFACTURE

From the onset, it must be recognised that the aforementioned specialization of function was to take place at the regional level. On the one hand, this movement towards regional specialization was conditioned by 'two groups of factors, resources [broadly defined to include minerals, agriculture, water, and manpower] and economies of scale, or put differently, the effects of nature and the effects of society, causes that were permanent and those that were historical.'<sup>44</sup> On the other hand, to supplement this perhaps overly technico-historical interpretation, one might also argue that as a vestige of late medieval development, regional specialization was dominant in so far as 'town/country relations...were most effective at a regional rather than supra-regional level' and as 'the region [was] where the most effective and strongest political and administrative organization took shape.'<sup>45</sup>

In this way, regional specialization led to a number of advantages over dispersed, unspecialized production. Following Krugman (following Marshall), we can identify three such advantages for industry and manufacture. 'First by concentrating a number of firms in an industry in the same place, an industrial center allows for a pooled market of workers with specialized skills.'<sup>46</sup> At a time when the distinguishing factor of industry/manufacture was not the sophistication or complexity of physical capital, but rather the intimate knowledge of 'local information, technique and practice' possessed by labour, this pooling of specialized labour could be of obvious benefit;

---

<sup>43</sup> A. Kussmaul, *A General View of the Rural Economy of England, 1538-1840*, (Cambridge, 1993) 111.

<sup>44</sup> S. Pollard, 'Regional Markets and National Development,' in *Markets and Manufacture in Early Industrial Europe*, ed. M. Berg, (London, 1991) 35.

<sup>45</sup> S.R. Epstein, 'Cities, Regions and the Late Medieval Crisis,' *Past and Present* 130 (1991), 11.

<sup>46</sup> P. Krugman, *Geography and Trade*, (London, 1991) 37.

additionally, due attention should also be paid to the fact that as ‘a region is normally the storehouse not just of one skill, but of a range of complementary skills,’<sup>47</sup> the proliferation of backward and forward linkages in the local and international economies was encouraged.

‘Second, an industrial center allows provision of inputs specific to an industry in greater variety and at lower cost;’<sup>48</sup> and we might add, for the pre-industrial age, presumably with greater reliability. What this means is that individual enterprises in the pre-industrial economy could benefit from the simple geographic proximity of other enterprises by the spreading of certain fixed costs associated with transportation, distribution, finance, etc. which no individual enterprise in isolation could surmount. These serendipitous external economies created by the spreading of fixed costs, as it were, provided for significant cost savings, opened hither-to unopened doors of opportunity, and played an important role in other aspects of the economy besides the provision of inputs to industry. Additionally, this rise in regional specialization in conjunction with the creation of backward and forward linkages also gave occasion to a ‘vertical disintegration in production, where each firm [not only] undertakes fewer and fewer steps of the production process itself, [but also] buys its inputs from one set of [specialized] producers and sells its outputs to other [specialized] producers,’ thereby, allowing for an even lower, economy-wide cost of the provision of inputs.<sup>49</sup>

Third, ‘because information flows locally more easily than over greater distances, an industrial center generates what we would now call technological spillovers.’<sup>50</sup> For the time period at hand, it may be a little premature to speak strictly of ‘technological spillovers,’ yet nonetheless, as Szostak explains, it certainly was the case that ‘the degree of regional specialization affected the rate at which an innovation spread’ while ‘an expanding market served to hasten the spread of innovation by causing the emergence of new productive units.’<sup>51</sup> Furthermore, ‘regional specialization and improved flows of information, to the extent that they caused minor changes in technique to be transmitted between firms, would increase

---

<sup>47</sup> S. Pollard, ‘Regional Markets,’ 41.

<sup>48</sup> P. Krugman, *op. cit.*, 37.

<sup>49</sup> M. Kelly, ‘The Dynamics of Smithian Growth,’ *Quarterly Journal of Economics*, 112 (1997), 943.

<sup>50</sup> P. Krugman, *op. cit.*, 37.

<sup>51</sup> R. Szostak, *The Role of Transportation in the Industrial Revolution*, (London, 1991), 27.

the potential gain from further innovation, and would make it easier to transmit major technological advances in the future.’<sup>52</sup>

Rounding out the discussion of the inherent advantages of regional specialization will be a consideration of additional ‘dynamic’ gains not considered by Marshall and, hence, Krugman. Due to the incorporation of localized industrial production into a world market,

‘producers and sellers operating in it [the world market] had to meet the competition of other producers, and while competition has not been unknown before, it had taken place within a stable and geographically limited environment. Now producers were forced to be alert and to be knowledgeable about things going on elsewhere, and at the least to question the tendency of many producing regions to believe that it was precisely their local tradition, specialism, style or quality that the world was waiting for and was willing to pay for, which had imposed an immobilism on everyone concerned with local production in the past...But, simultaneously, ‘world’ markets also meant the opportunity to expand, to find new, better or more regular demand conditions.’<sup>53</sup>

Thus, Pollard has identified the two key ‘dynamic’ gains of regional specialization associated with international market integration, namely increased competition and more elastic demand conditions, both of which have the natural corollary of increased production. Incidentally, it is also these two gains which seem to explain the development of proto-industry in this period. For as Hohenberg writes, the ‘natural candidates for rural p-i [sic]’ were precisely those goods which exhibited a marked price-elasticity in demand, and that ‘for the most part p-i [sic] did not develop in the best agricultural areas but in marginal zones accessible to commercial food supplies,’ presumably due in part to increased competition – via market integration – on agricultural markets.<sup>54</sup>

At this point, it may be found instructive to attempt to relate these points to the structure of early modern production as represented by the Dutch shipbuilding

---

<sup>52</sup> *Ibid.*, 28.

<sup>53</sup> S. Pollard, ‘Regional Markets,’ 30-1.

<sup>54</sup> P.M. Hohenberg, ‘Urban Manufactures in the Proto-Industrial Economy’ in *Markets and Manufacture in Early Industrial Europe*, ed. by M. Berg, (London, 1991), 162, 164.

industry centred in Holland, for in it, we truly find 'an industry of modern dimensions' with its strong inclination towards standardised and repetitive methods.<sup>55</sup>

From somewhat unpromising beginnings, the Dutch shipbuilding industry arose to a position of absolute leadership in the early seventeenth century. Indeed, even by 1596, the town council of Amsterdam could boast that 'dese landen int stuck van coopvaerdye ende menichte van schepen der Coninckrijcken van Vrankrijck ende Engelandt zoe verre te boven gaen, dat daervan nauwelicx eenige comparitie mach worden gemaect [this country in merchant marine and shipbuilding is so much more advanced than the kingdoms of France and England that it is scarcely possible to make a comparison];'<sup>56</sup> and much of this pre-eminence is directly attributable to the advantages of specialisation as outlined above.

In the first place, the concentration of shipbuilding activity in Holland did allow for the pooling of specialised labour. This is attested to by the fact that over the period of 1580 to 1604 over one thousand persons involved in the industry were admitted into the *poorterschap* of Amsterdam alone while in the seventeenth century a minimum of ten thousand men – a significant portion of whom must be classified as skilled labour - earned their living on the shipbuilding wharves of Holland;<sup>57</sup> and although it must admitted that in this particular case the role of skilled labour became relatively dampened over time as the need for unskilled labour mushroomed with the increasing scale of ships being built,<sup>58</sup> the knowledge and skills of ship carpenters and, especially, shipwrights remained at a very high premium.<sup>59</sup> Furthermore, the complement of skills in the region was also to be a powerful stimulus to the development of a number of other trades and industries, such as anchor-, nail-, rigging-, rope-, and sail-making as well as cod, herring, and whale fishing.<sup>60</sup>

---

<sup>55</sup> C. Wilson, 'Transport as a Factor in the History of Economic Development,' *Journal of European Economic History*, 2 (1973), 329.

<sup>56</sup> Quoted in J.E. Elias, *Het Voorspel van den Eersten Engelschen Oorlog*, ('s-Gravenhage, 1920) 60.

<sup>57</sup> V. Barbour, *Capitalism in Amsterdam*, 19; and R.W. Unger, *Dutch Shipbuilding before 1800*, (Assen, 1978) 11.

<sup>58</sup> R.W. Unger, *The Ship in the Medieval Economy, 600-1600*, (London, 1980) 272-3.

<sup>59</sup> C. Koninckx, 'Recruitment of Dutch Shipwrights,' in *Baltic Affairs: Relations between the Netherlands and North-Eastern Europe, 1500-1800*, eds. Lemmink and van Koningsbrugge, (Nijmegen, 1990); and G.P.B. Naish, 'Ships and Shipbuilding,' in *A History of Technology*, Vol. III, eds. Singer et al, (Oxford, 1957).

<sup>60</sup> J.A. van Houtte, *An Economic History of the Low Countries, 800-1800*, (London, 1977) 174; R.W. Unger, *Dutch Shipbuilding before 1800*, 7-8.



Partly flowing from this proliferation of backward and forward linkages, we see the provision of inputs to the shipbuilding industry as one of its key advantages. This is made particularly evident in relation to the timber (and forest products) trade and milling industry. In regards to the former, the timber trade, we find that the collective demand of the industry was great enough to call forth a response from the Dutch merchant community which went about to spread an ever-growing net over the timber-producing capacities of Norway, Poland, and the Baltic states alike.<sup>61</sup> In regards to the latter, the milling industry, it has been noted that the presence of wind-powered lumber sawing mills, particularly in the Zaan region, gave the shipbuilding firms 'ready access to a large and varied assortment of lumber inventories that they did not have to stock themselves.'<sup>62</sup> Taken together, these developments – as one English contemporary noted – 'allowed the Dutch to make themselves the 'Mart and Masters' of all shipbuilding materials' and came to signify a tremendous cost advantage for Dutch producers.<sup>63</sup> Likewise, the existence of significant information flows hastened by regional specialisation led to the development of the industry's greatest innovation, that of the *fluit*. As has long been noted, the *fluit* represented a breakthrough in shipping, in that it represented the recent differentiation between ships for violence and ships for trade.<sup>64</sup> However, the *fluit* was to come to represent a new era not only in terms of operating and shipping costs, but also in terms of production costs. Its simple rigging, shorter masts and spars, smaller sails, and predominant use of pine resulted in a finished product which was necessarily cheaper to produce than earlier types. Underlying this development was the driving force of 'incremental progress' in design,<sup>65</sup> at a time when symbolically transmittable information in shipbuilding was largely precluded due to the lack of success in

---

<sup>61</sup> Cf. S. Åstrom, 'Technology and Timber Exports from the Gulf of Finland, 1661-1740,' *Scandinavian Economic History Review*, 23 (1975), 1-14; J.G. van Dillen, *Van Rijkdom en Regenten: Handboek tot de Economische en Sociale Geschiedenis van Nederland Tijdens de Republiek*, ('s-Gravenhage, 1970) 59-62, 348; and A. Maczak, 'The Balance of Polish Sea Trade with the West, 1565-1646,' *Scandinavian Economic History Review*, 18 (1970), 107-42.

<sup>62</sup> J. de Vries and A. van der Woude, *The First Modern Economy: Success, Failure, and Perseverance of the Dutch Economy, 1500-1815*, (Cambridge, 1997) 298.

<sup>63</sup> C. Wilson, *Power and Profit*, (London, 1957) 42; see also, C.A. de Feyter, *Industrial Policy and Shipbuilding: Changing Economic Structures in the Low Countries, 1600-1890*, (Utrecht, 1982) 137-40.

<sup>64</sup> V. Barbour, 'Dutch and English Merchant Shipping in the Seventeenth Century,' *Economic History Review*, 2 (1930), 280-2.

<sup>65</sup> R.W. Unger, *The Ship in the Medieval Economy*, 262.

mathematically formalising the concepts and techniques of the industry,<sup>66</sup> this progress was only made possible by the close proximity of producers to one another and their corresponding ability to gather the fruits of close, empirical but systematic observation of competing designs.

These advantages in labour supply, inputs, and innovation arising from the regional specialisation of the shipbuilding industry amounted in the end to ‘an overall cost of production, as late as the mid-seventeenth century, that was forty to fifty per cent cheaper than in England, their nearest competitor.’<sup>67</sup> Compounded with ‘cheap and careful navigation,’ this was ‘summed up in the lowest freight rates in Europe, and the most extensive and efficient merchant marine...[so that] *in years when both England and the Republic were at peace*, Dutch rates would be one-third to one-half lower than the English for the same voyage;’<sup>68</sup> thus, creating the potential for a virtuous cycle of lower production costs stimulating lower shipping costs stimulating, in turn, lower production costs.

In summary, the process of regional specialisation as initiated by market integration was clearly to have tremendous effects on the growth experience of not only the Dutch shipbuilding industry but also the economy at large – both national and international. This last observation is attested to the fact that very similar processes of integration and specialisation took place in a veritable host of industries throughout the Baltic and North Seas region.<sup>69</sup>

## **V.B. AGRICULTURE**

Up to now, we have only been considering the advantages of specialisation accruing to industry and manufacture, but this by no means should imply that the benefits of the division of labour were not applicable to agriculture. Once again, our eyes must turn to the Dutch, for, perhaps, no greater example of this process of agricultural specialisation is the case of the northern Netherlands.

---

<sup>66</sup> J. Mokyr, *The Lever of Riches*, (Oxford, 1990) 75.

<sup>67</sup> I. Wallerstein, ‘Dutch Hegemony in the Seventeenth Century,’ in *Dutch Capitalism and World Capitalism*, ed. M. Aymard, (Cambridge, 1982) 109.

<sup>68</sup> V. Barbour, ‘Dutch and English Merchant Shipping in the Seventeenth Century,’ 285; emphasis mine.

<sup>69</sup> For England, see T.S. Ashton, *An Economic History of England: The Eighteenth Century*, (London, 1955) 91-7, 103-4, 124; for Danzig, see M. Bogucka, *Gda* (Warsaw, 1962) 163-5; and for the Southern and Northern Netherlands, see J.A. van Houtte, *An Economic History of the Low Countries*, 170-4, 255-7, 264-9.

As we have noted, the trading connections drawing the Dutch and greater Baltic economies together were initiated in the 14<sup>th</sup> century and intensified until which time the trade became known as ‘de moedercommercie [the mother-commerce],’ ‘de hoofdnegotie [the chief trade],’ or, as was expressed in 1646, ‘de siele van de gehele negotie, waeraan alle andere commerciën ende traffiquen dependeren [the soul of the entirety of trade, on which all other commerce and traffic depend].’<sup>70</sup> And at the heart of this interaction was found the grain trade which was further described by no less a commentator than the Grand Pensionary of Holland, Johan de Witt, as ‘de source ende wortel der notabelste commercie ende naviagtie dezer Landen [the source and root of the most notable commerce and navigation of these lands].’<sup>71</sup>

The evolution of the Baltic grain trade allowed for an increasingly great independence in the northern Netherlands in regards to agricultural production. For as the grain trade progressed, rural producers in the northern Netherlands found themselves in a unique position: ‘the development of a strongly linked, international economy caused local needs and relative prices to be superseded by supply and demand forces determined on a much larger – an international – scale.’<sup>72</sup> Capitalising on the impressive capacities of the region in general (and Amsterdam in particular) to command and orchestrate the grain trade,<sup>73</sup> Dutch farmers began to free themselves from the distinctly early modern ubiquity of grain production; and in its place substituted a pattern of highly specialised agricultural production. This pattern was to take the form of an increased emphasis on industrial and horticultural crops as well as on dairy farming;<sup>74</sup> with time, it could be noted that ‘the switch-over was so complete that farmers used imported grain even for their own consumption.’<sup>75</sup>

Additionally, the process of market integration was also vital in another respect. It enabled the development of markets in farm inputs, such as fodder, fertiliser, breeding stock, equipment, and transport services, which further augmented the productive powers of the rural economy; in other words, it is thought that market integration not only inaugurated a growing differentiation of tasks among rural

---

<sup>70</sup> Quoted in J.G. van Dillen, *Van Rijkdom en Regenten*, 37.

<sup>71</sup> *Ibid.*, 39.

<sup>72</sup> J. de Vries, *The Dutch Rural Economy in the Golden Age, 1500-1700*, (New Haven, 1974) 144.

<sup>73</sup> H.C. Diferee, *De Geschiedenis van den Nederlandschen Handel tot den Val der Republiek*, (Amsterdam, 1908) 175-80.

<sup>74</sup> J. de Vries, *The Dutch Rural Economy in the Golden Age*, 152-5, 164-7.

households but also within them as well, as they were able to 'shed from their work schedules a wide variety of tasks necessary to sustain the household in a regime of relative self-sufficiency and [concentrate] their efforts on the remaining tasks, the more strictly agricultural tasks,' thus, allowing even greater specialisation.<sup>76</sup>

What these tendencies towards greater market integration and greater specialisation translated into was a profound impact upon agricultural productivity. Following de Vries and van der Woude's estimates, it can be asserted that the rural economy of the northern Netherlands witnessed an increase in agricultural output between 1510 and 1650 somewhere on the order of 150 percent, an astounding figure for the early modern world; furthermore, a very large portion of this increase must be directly attributed to the influence of market integration on the factors outlined above.<sup>77</sup>

Although probably outstanding in the strictest sense of the word, it must not be thought that such gains in productivity and output were confined to that curious accretion of the European landmass known as the northern Netherlands. Similar indications of increased agricultural specialisation via market integration became noticeable in the southern Netherlands, Denmark, and England – albeit at different times and with different intensities.<sup>78</sup>

Indeed, in the English case, A.H. John positively locates the source of the 'great redundancy of corn, cattle, butter, cheese and other commodities' evident after the Restoration in the nexus of opportunities created by the joint influences of the London and international markets for grain.<sup>79</sup> Furthermore, John powerfully argues against those who would dismiss international trade as peripheral to the English economy at this time, for 'the use of aggregate figures can be misleading in judging the

---

<sup>75</sup> B.H. Slicher van Bath, *Agrarian History of Western Europe*, 241.

<sup>76</sup> J. de Vries and A. van der Woude, *The First Modern Economy*, 204; and J. de Vries, *The Dutch Rural Economy in the Golden Age*, 136-7.

<sup>77</sup> J. de Vries and A. van der Woude, *The First Modern Economy*, 198, 232-3.

<sup>78</sup> P.J. Bowden, 'Agricultural Prices, Wages, Farm Profits and Rents,' in *The Agrarian History of England and Wales*, Vol. V, ed. J. Thirsk, (Cambridge, 1985) 19-21; J.A. Chartres, 'Market Integration and Agricultural Output in Seventeenth-, Eighteenth-, and early Nineteenth-Century England,' *Agricultural History Review*, 43 (1995), 133-5; O. Feldæk, *Danmarks Økonomiske Historie, 1500-1840*, (Herning, 1993) 123-9; J.A. van Houtte, *An Economic History of the Low Countries*, 146-9, 237-42; and A. Kussmaul, 'Agrarian Change in Seventeenth Century England: The Economic Historian as Paleontologist,' *Journal of Economic History*, 45 (1985), 1-30.

<sup>79</sup> A.H. John, 'English Agricultural Improvement and Grain Exports, 1660-1765,' in *Trade, Government and Economy in Pre-Industrial England*, eds. Coleman and John, (London, 1976) 47-8.

importance of the trade at a time when grain markets were regional rather than national;’ in this way, ‘this regional concentration...alters the significance of the market opportunities provided for the farmers able to take advantage of them.’<sup>80</sup>

In summary, we have examined the ‘static’ and ‘dynamic’ gains to industry/manufacture and agriculture from increased regional specialization via market integration. What has not been explicitly stated, but implicitly followed from the exposition of all these gains was the universal, increasing scale of production which took place in those regions and sectors which committed themselves to full specialization. Accordingly, this is the heart of the so-called Smithian growth process generated by market integration.

## **VI. CHARTING THE COURSE OF MARKET INTEGRATION IN THE EARLY MODERN AGE**

In light of the foregoing discussion, it must now be recognized that ‘...it is one thing to speak of regional specialization in the language of economic geography, but...inherent tendencies towards specialization do not become actual without

<sup>81</sup> That is to say, our attention must now be turned towards the perhaps more important and certainly more difficult questions of what was driving the actualisation of markets and why the process of market integration followed the particular path it took. What this section aims at is the identification of some of the proximate factors in shaping the course of market integration, yet it must be recognized that the constraints of time and space being what they are will necessarily limit the discussion to those factors which transcend regional and national boundaries. Therefore, detailed examinations of the country-specific institutional constellations underlying these factors and the development of market integration are left for future research.

To begin with, the students of the early modern European economy have always been aware of the existence of certain monetary and price trends which although variant in their periodicity and intensity appeared in roughly similar form across many areas of the European land mass, particularly in the regions under

---

<sup>80</sup> *Ibid.*, 49-50.

<sup>81</sup> Kussmaul, *A General View of the Rural Economy of England*, 115.

current consideration.<sup>82</sup> Unless the picture we have painted previously of market integration has been too rosy, it should be obvious that these trends, coupled with idiosyncrasies of regional production, distribution, etc., did allow for some divergence in prices, especially in particular years when exogenous shocks – such as wars or harvest failures – occurred. And where such divergence was evident, one would expect that the prospects of successful arbitrage across markets would lead to the interaction of international markets; indeed, it is this assumption which has been the implicit basis of all the foregoing discussion of market integration. Furthermore, in confronting this expectation with the historical record, one is not to be disappointed, in that it is clear that the Dutch, English, and Polish markets, at the very least, were all linked by the allure of profits arising from inherent price differentials.<sup>83</sup>

What remains to be determined is the extent to which the prospects and/or the realisation of successful arbitrage were hampered in the context of the early modern world. Naturally, our attention is once again reverted to the simple identity,  $P_1 = P_2 + t$ . However, in this instance, it may be instructive to decompose  $t$  into costs of transportation and transactions.

Firstly, the theme of the dearness of transportation, especially that overland, in the early modern age is one which is not easily lost, for even at the beginning of the nineteenth century, ‘the furthest possible distance [overland] for transporting timber or grain was about twelve miles: beyond it the cost of freight began to exceed the value of the goods.’<sup>84</sup> Of course, even this state of things was an improvement on the conditions obtaining in 1675 when the corresponding range for coal was about two miles.<sup>85</sup> And even for those who would have us look to nearly costless water transport as an effective escape from this situation,<sup>86</sup> one must counter with the objection that the empirical record simply does not bear out this assumption.<sup>87</sup>

---

<sup>82</sup> J. de Vries, *The Economy of Europe in an Age of Crisis, 1600-1750*, (Cambridge, 1976) 16-21, 244-7; and I. Wallerstein, *The Modern World System I: Capitalist Agriculture and the Origins of the European World-Economy in the 16<sup>th</sup> Century*, (London, 1974) 69-77.

<sup>83</sup> M. Bogucka, ‘Amsterdam and the Baltic in the First Half of the 17<sup>th</sup> Century,’ *Economic History Review*, 26 (1973), 435; and A. Maczak, ‘The Balance of Polish Sea Trade with the West, 1565-1646,’ 115-6.

<sup>84</sup> S. Pollard, *European Economic Integration*, (London, 1974) 38.

<sup>85</sup> C. Wilson, ‘Transport as a Factor in the History of Economic Development,’ 331.

<sup>86</sup> K. Berrill, ‘International Trade and the Rate of Economic Growth,’ *Economic History Review*, 12 (1959), 351-9.

<sup>87</sup> Cf. P. Jeannin, ‘The Sea-borne and the Overland Trade Routes of Northern Europe in the XVI<sup>th</sup> and XVII<sup>th</sup> Centuries,’ *Journal of European Economic History*, 11 (1982), 30-5; J.H. Parry, ‘Transport and

One may, therefore, expect that our particular course of market integration in the North and Baltic seas area may be educible in part to changes in transportation costs. However, as Menard holds, 'if we begin in the early 14<sup>th</sup> century, the case for a European transport revolution led by technological innovations vanishes. Freight charges in the mid-18<sup>th</sup> century were only slightly lower than in the best years of the high Middle Ages.'<sup>88</sup> Furthermore, this interpretation is in congruence with the historical record of freight rates originating in Amsterdam which point more to external determinants (specifically the international diplomatic environment) than any inherent progression of transportation facilities.<sup>89</sup>

The inability of falling transport costs alone to explain the course of market integration, therefore, leads us to consider the role of transaction costs. At this point, we shall reinvok North's definition of transaction costs as 'all the costs of human beings interacting with each other,' which along with production costs define 'whether trade, specialization, and production and interchange will occur.'<sup>90</sup> Furthermore, we shall explore the ramifications of innovations which North singles out as essential to economic growth. These were to be 'innovations that lowered transaction costs,' which 'consisted of organizational innovations, instruments, and specific techniques and enforcement characteristics that lowered the costs of engaging in exchange over long distances,' and which 'occurred at three costs margins: 1) those that increased the mobility of capital; 2) those that lowered information costs; and 3) those that spread risk.'<sup>91</sup>

Beginning with those innovations that increased the mobility of capital, we find in this era and region – as does North – the evolution of the bill of exchange of particular importance. Benefiting from the their Flemish counterparts' superior

---

Trade Routes,' in *The Cambridge Economic History of Europe*, vol. IV, eds. Rich and Wilson, (Cambridge, 1967) 216-8; S. Pollard, *European Economic Integration*, 39; T.S. Willan, *River Navigation in England, 1600-1750*, (London, 1936) 114-30; and L. Zytkowicz, 'Trends of Agrarian Economy in Poland, Bohemia and Hungary from the Middle of the 15<sup>th</sup> to the Middle of the 17<sup>th</sup> Century,' in *East-central Europe in Transition from the 14<sup>th</sup> to the 17<sup>th</sup> Century*, eds. Maczak et al, (Cambridge, 1985) 60.

<sup>88</sup> R.R. Menard, 'Transport Costs and Long-Range Trade, 1300-1800: Was There a European 'Transport Revolution' in the Early Modern Era?' in *The Political Economy of Merchant Empires*, ed. J.D. Tracy, (Cambridge, 1991) 274.

<sup>89</sup> J.I. Israel, *Dutch Primacy in World Trade*, 87-90, 135-137.

<sup>90</sup> D.C. North, 'Institutions, Transaction Costs, and the Rise of Merchant Empires,' 24.

<sup>91</sup> *Ibid.*, 27.

experience with bills of exchange,<sup>92</sup> Amsterdam merchants were able to transform the city into the nexus of international payments on balances of trade from the 1550s; and the bill of exchange was to long remain one of the bedrocks of this precocious multi-lateral payments system.<sup>93</sup> Additionally, to this innovation, we might also add two further developments, particular to the Baltic-North Seas region which invariably increased the mobility of capital, namely the evolution of futures contracts on grains and other commodities in the early 16<sup>th</sup> century<sup>94</sup> and the rapid rise in the early 17<sup>th</sup> century 'of the factorage system which at that time became the vital organizational basis for international exchange.'<sup>95</sup>

In regards to innovations that lowered information costs, North cites the printing of manuals detailing particulars of weights, measures, customs, etc. alongside the more important development of compendiums of commodity prices and exchange rates. For the North and Baltic Seas area, this latter development was summed up in the *prijscourant* of Amsterdam. Printed weekly from 1585 – and perhaps even earlier, the *prijscouranten* quickly broadened their scope to include not only commodity prices on an astonishingly wide range of goods but also the means of settlement, i.e. money, exchange, and insurance. Their indispensability to the early modern northern economy is attested to by their presence in archival collections in such locales as Antwerp, Brussels, Danzig, Copenhagen, London, and Stockholm.<sup>96</sup>

Finally, those innovations which are thought to have spread risk were found in particular abundance at this time. Firstly, we may take note of the emergence of marine insurance. Again, taking their lead from Flemish and Italian predecessors, the Dutch and English, in the sixteenth century, evolved a relatively sophisticated market for the assurance of goods and ships, culminating in the establishment of chambers of

---

<sup>92</sup> H. van der Wee, *The Growth of the Antwerp Market and the European Economy*, Vol. II, ('s Gravenhage, 1963) *passim*.

<sup>93</sup> A. Attman, *Dutch Enterprise in the World Bullion Trade*; M. North, 'Bullion Transfer from Western Europe to the Baltic and the Problem of Trade Balances: 1550-1750,' in *From the North Sea to the Baltic*, (Aldershot, 1996); and J. Schneider, 'The Significance of Large Fairs, Money Markets and Precious Metals in the Evolution of a World Market from the Middle Ages to the First Half of the 19<sup>th</sup> Century,' in *The Emergence of a World Economy, 1500-1914*, Part I, eds. Fischer et al, (Stuttgart, 1986).

<sup>94</sup> M. Malowist, 'The Economic and Social Development of the Baltic Countries from the 15<sup>th</sup> to the 17<sup>th</sup> Centuries,' *Economic History Review*, 12 (1959), 186.

<sup>95</sup> M. Bogucka, 'Amsterdam and the Baltic in the First Half of the 17<sup>th</sup> Century,' 440; see also, M. North, 'The Grain Trade of Royal and Ducal Prussia in the 16<sup>th</sup> and 17<sup>th</sup> Centuries,' in *The Baltic Grain Trade*, ed. W. Minchinton, (Exeter, 1985) 24-5.

<sup>96</sup> N.W. Posthumus, *Nederlandsche Prijsgeschiedenis*, Vol. I, (Leiden, 1943) xxv-xxviii.



assurance – in 1598 for Amsterdam and in 1601 for London.<sup>97</sup> Furthermore, these developments were to be later followed by similar ones in the wider northern seas arena.<sup>98</sup> Secondly, changes in business organization may also be looked to as sources of risk spreading. On the part of the Dutch, we see the development of shares in shipping and the distribution of investment via ‘fractional ownership,’ or *partenrederijen*, which allowed for a wide scale of investment opportunities ranging from 1/64<sup>th</sup> to 1/8<sup>th</sup> shares in an even wider range of seagoing vessels;<sup>99</sup> this system of *partenrederijen*, interestingly enough, was to find an alternate expression as a form of limited partnership which eventually spread to find applications in the whole gamut of commercial and industrial enterprises of the Republic.<sup>100</sup> Similarly, in both England and Holland, we see the increasing importance of regulated and joint-stock companies as a powerful means of diversification in investment.<sup>101</sup>

To this somewhat cursory sample of transaction-costs-reducing innovations may be added a number of others: the extension and intensification of parcel and passenger services among many of the cities of the northern seas region, the establishment of the *Wisselbank* of Amsterdam and the Bank of England, the emergence of sale by sample, formal business schooling, and the increasing use of double entry bookkeeping to name just a few. What all the aforementioned have in common is an insistence on economies of scale in the transactions sector; and if, for the moment, we cast our investigation of market integration in the mould of that

---

<sup>97</sup> V. Barbour, ‘Marine Risks and Insurance in the 17<sup>th</sup> Century,’ *Journal of Economic History*, 1 (1929), 572-3; A.H. John, ‘The London Assurance Company and the Marine Insurance Market of the 18<sup>th</sup> Century,’ *Economica*, 25 (1958), 126-41; and F.E. de Roover, ‘Early Examples of Marine Insurance,’ *Journal of Economic History*, 5 (1945), 172-200.

<sup>98</sup> G.A. Kiesselbach, *Die Wirtschafts- und Rechtsgeschichtliche Entwicklung der Seevericherung in Hamburg*, (Hamburg, 1901) 20-32; F. Spooner, *Risks at Sea: Amsterdam Insurance and Maritime Europe*, (Cambridge, 1983) 43-4; and C. Thorsen, *Det Kongelig Oktroierede Sø-Assurance Kompagni*, (Copenhagen, 1926) 43-75.

<sup>99</sup> V. Barbour, ‘Marine Risks and Insurance in the 17<sup>th</sup> Century,’ 569-70.

<sup>100</sup> J. de Vries and A. van der Woude, *The First Modern Economy*, 338.

<sup>101</sup> A.B. Du Bois, *The English Business Company after the Bubble Act, 1720-1800*, (Oxford, 1938) 84-97; J.A. van Houtte, *An Economic History of the Low Countries*, 198-201, 280-1, 309; and W.R. Scott, *The Constitution and Finance of English, Scottish and Irish Joint-Stock Companies to 1720*, Vol. II & III, (Cambridge, 1911) *passim.*; and N. Steensgaard, ‘The Dutch East India Company as an Institutional Dutch Capitalism and World Capitalism,’ ed. M. Aymard, (Cambridge, 1982).

patterned by Reed, we might be able to make some progress in explaining the course of market integration.<sup>102</sup>

Essentially, it is Reed's contention that growth in this period is explainable by the interaction between significant economies of scale in the transaction sector and an effective extension of the market through population growth. To quote, the model postulates that 'given the relatively constant technology of the period, growth, both extensive and intensive, can be explained by the population increase in conjunction with economies of scale; that the source of economies of scale lay in the transactions sectors...[that] the population growth beginning in the sixteenth century [gave] rise to large market areas and thereby allow[ed] realization of the economies of scale inherent in the transactions sector; and that the productivity increases brought about through realization of these economies of scale made possible...[a] continued population increase and...an increasing standard of living.'<sup>103</sup>

Following this reasoning, it may be then posited that market integration should be viewed as a function of population growth. The connection is, of course, obvious: with increasing population, a certain 'critical mass' is reached in the transactions sectors which create more and greater opportunities to profit from the spatial (and perhaps temporal) differentiation of prices, prompting an increase in market integration through the realisation of these self-same arbitrage opportunities.

In many respects, the demographic experiences of England and the northern Netherlands – if taken as broadly representative of our sample – bear out this view.<sup>104</sup> When projected upon the background of the population trends of the two countries in the first one hundred and fifty years of this study, our earlier measurements of market integration track the developments in population growth exceptionally well: in both countries, the nearly continuous growth in population is mirrored in a nearly continuous decrease in the coefficients of variation, a less rapid increase in the R-

---

<sup>102</sup> Incidentally, all of the innovations explored above share a further commonality: they all had their inception in the late Middle Ages. Clearly, then, when we speak of innovation in this setting, we are referring to a (not strictly) Schumpeterian view of innovation in utilisation, rather than in conception.

<sup>103</sup> C.G. Reed, 'Transactions Costs and Differential Growth in Seventeenth Century Western Europe,' *Journal of Economic History*, 33 (1973), 177-8.

<sup>104</sup> J. de Vries, 'The Population and Economy of the Preindustrial Netherlands,' *Journal of Interdisciplinary History*, 15 (1985), 674-8; and E.A. Wrigley and R.S. Schofield, *The Population History of England, 1541-1871*, (London, 1981) 168, 402-3.

statistics, and general improvements in long- and short-run market integration as evidenced by both the Ravallion regressions and the rank-size distribution of cities.

However, as our attention is drawn towards the midpoint of our study, 1650, the applicability of the model apparently falters; for as population levels out in the two countries, the various measures of market integration almost unanimously indicate a serious disruption in the underlying, integrative processes, dating from c. 1650 until c. 1680 at the earliest. At this time, another contributory factor in the course of market integration immediately suggests itself, namely the exigencies of the state, as particularly exhibited by the international diplomatic environment.

Naturally, the role of the state in channelling and re-shaping the flows of trade was not easily lost on the commercial participants of the time; the sensitivity and, at times, outright fragility of international trade upon the political arena, reflected in highly variable commodity prices and rates of freight and insurance alike, was the cause of much consternation.<sup>105</sup> Certainly, no period of this study was wholly immune to such considerations; but the period from 1650 to 1680 witnessed an incredible volatility for the Baltic-North Seas region as a whole.

It begins with a souring of relations between the English and the Dutch, brought about by economic rivalry, which was to receive its first official manifestation in the Navigation Act of 1651 and which directly led to the First Anglo-Dutch War of 1652-4.<sup>106</sup> This, in turn, was followed by a second Navigation Act in 1660 and a Second and Third Anglo-Dutch War in 1665-7 and 1672-4, respectively. In relation to the wider northern region, the First and Second Dutch Wars were to gain particular significance in that both witnessed the Danish Sound being closed to all English traffic and the cessation of much and, at times, all seagoing traffic from Amsterdam and London.<sup>107</sup> Punctuating this already precarious situation, we find the Swedish-Polish War of 1655-60 which cut off Danzig's exports for five years and saw the far-from-last intervention of Dutch military forces in Baltic conflicts, a simultaneous war between Poland and Russia, a series of wars between Denmark and Sweden up until 1660 which was resumed between 1674 and 1678, and a devastating war between the

---

<sup>105</sup> H.Q. van Ufford, *A Merchant Adventurer in the Dutch Republic*, (Amsterdam, 1983) 52-3.

<sup>106</sup> J.E. Farnell, 'The Navigation Act of 1651, the First Dutch War, and the London Merchant Company,' *Economic History Review*, 16 (1964), 439-54.

<sup>107</sup> J.R. Jones, *The Anglo-Dutch Wars of the 17<sup>th</sup> Century*, (London, 1996) 26; C. Wilson, *Profit and Power*, 72, 75, 140, 156.

Netherlands and France which coincided with the Third Anglo-Dutch War – all of which were to be executed with tremendously detrimental effect upon the respective national and international economies alike.<sup>108</sup> That the cause of market integration should suffer in this unstable environment should occasion no surprise.

But for all this, the period from 1650 to 1680 merits our especial attention for another reason in regards to the role of the state; for whereas the entire era from 1500 to 1800 may be said to evidence particular sensitivity to external political shocks such as war, this period also marks a transition in that the germination of a novel approach of states to the structure of markets may be seen. However, before anything may be further said about this novel approach, an examination of the prevailing market structure prevailing prior to 1650 is in order.

The observations of the Dutch economist T.P. van der Kooy in this respect are particularly enlightening.<sup>109</sup> According to van der Kooy, the vagaries of the early modern economy – shoddy transport, communication, and production apparatus – were such as to require a distributive network based on a single, general world entrepôt which would control price formation and, thus, production and consumption. In this way, the model relates back to the assumptions made previously with the Ravallion model in that the staple market was to function as ‘the keystone of a hierarchical system of local and regional markets, from which surpluses passed on to markets of a higher order...[and to which] the marginal unit of a given product found its way...so that price regulation became an accomplished fact.’<sup>110</sup> The concentration of supply and demand that arose from this situation allowed for a so-called ‘transparency’ in the market which reduced uncertainty and risk and allowed for the development and refinement of services essential to the system’s proper functioning. In other words, the development of Amsterdam as the staple market of Europe from

---

<sup>108</sup> P. Andersen, *Lineages of the Absolutist State*, (London, 1974) 200, 291.; J.A. Faber, ‘Friesland and the Baltic Trade,’ in *From Dunkirk to Danzig: Shipping and Trade in the North Sea and the Baltic, 1350-1850*, eds. Heeres et al, (Hilversum, 1988) 18-9; J.I. Israel, *Dutch Primacy in World Trade*, 213-9; W. Minchinton, Introduction to *The Baltic Grain Trade*, (Exeter, 1985) 7-8; W. Sondstrom, ‘Evidence on Dutch-Swedish Trade in the 17<sup>th</sup> Century,’ in *Baltic Affairs: Relations between the Netherlands and North-Eastern Europe, 1500-1800*, eds. Lemmink and van Koningsbrugge, (Nijmegen, 1990) 214-7; J. Topolski, ‘Economic Decline in Poland from the 16<sup>th</sup> to the 18<sup>th</sup> Centuries,’ in *Essays in European Economic History, 1500-1800*, ed. P. Earle, (Oxford, 1974) 129, 135; and J. de Vries and A. van der Woude, *The First Modern Economy*, 377.

<sup>109</sup> T.P. van der Kooy, ‘Holland als Centrale Stapelmarkt in de Zeventiende en Achttiende Eeuw,’ in *Van Stapelmarkt tot Welvaartsstaat*, ed. P.W. Klein, (Rotterdam, 1970); and especially, T.P. van der Kooy, *Hollands Stapelmarkt en Haar Verval*, (Amsterdam, 1931).

1500 to 1650 may be taken as yet another institutional innovation which struck at the drag on economic activity and growth represented by transaction costs.

Such a concentration of supply and demand certainly had other particular allures for states besides the dispersal of transaction costs, one of the most obvious being the attraction as an easy source of taxation. Perhaps this lesson was most duly taken in England where, from the mid-seventeenth century, 'it became a major object of policy to make Britain 'the common depositum, magazine, or storehouse for Europe and America, so that the medium profit might be made to centre here'.<sup>111</sup> This political objective of the English to usurp the role of Amsterdam was based on the popular assumption 'that the trade of the world is too little for us two, therefore one<sup>112</sup> – perhaps giving the mission a much needed sense of urgency – and came to centre around two policy tools, the Navigation Acts and the use of export bounties.

Firstly, the Navigation Acts were indeed fundamentally 'aimed at securing by compulsion an increased flow of trade' in the hopes of creating 'by legislative act an entrepôt system which pleased those who preached that England should follow Holland's way to wealth.'<sup>113</sup> Their accomplishments in this direction sprung from their insistence on controlling the flow of imports into the country and on compelling the employment of English shipping over that of the Dutch, thus, acting as a spur to the shipping industry in particular and the transactions sectors in general through the adoption of Dutch-inspired techniques and institutional innovations.<sup>114</sup>

In this sense, the First Anglo-Dutch War, as a natural adjunct of the first Navigation Act, also made a powerful contribution. For English shipping, it resulted in the transfer of up to one thousand vessels into English hands through privateering, an addition which was reckoned to constitute nearly 50% of the English merchant fleet in 1654 and which was to serve as a basis of learning prized Dutch shipbuilding

---

<sup>110</sup> P.W. Klein, 'The Trip Family in the 17<sup>th</sup> Century,' *Acta Historiae Neerlandica*, 1 (1966), 187.

<sup>111</sup> T.S. Ashton, *An Economic History of England*, 161.

<sup>112</sup> S. Pepys, *The Diary of Samuel Pepys*, Vol. IV, ed. H.B. Wheatley, (London, 1920) 31.

<sup>113</sup> C. Wilson, *Profit and Power*, 57, 150.

<sup>114</sup> D. Ormrod, 'English Re-exports and the Dutch Staplemarket in the 18<sup>th</sup> Century,' in *Enterprise and History*, eds. Coleman and Mathias, (Cambridge, 1984) 93.

techniques;<sup>115</sup> at the same time, the war was to advance the direct carrying trade of England in several important areas, including the Baltic.<sup>116</sup>

Secondly, the increasing use of export bounties from the 1670s, too, was to alter the structure of trade in important ways. By stimulating and supporting the burgeoning trade in grains and the accompanying rise in specialist grain exporters, export bounties allowed for the gradual circumventing of the here-to-fore inescapable Dutch entrepôt.<sup>117</sup> Furthermore, the rise in the grain export trade was to come to represent yet another encouragement to English shipping by ensuring that the trade was carried on in English bottoms.<sup>118</sup> Yet in many ways, the most important role of the export bounties was that they played in absorbing transaction costs for commercial agents, thereby enhancing the competitiveness of English grains on international markets.<sup>119</sup> In this way, the export bounties heralded an era where England not only challenged 'the Baltic countries as a supplier of grain to Dutch granaries; she also replaced the Dutch as the carrier of that grain.'<sup>120</sup> Perhaps encouraged by the initial success of grain export bounties, the English government throughout the later 17<sup>th</sup> and early 18<sup>th</sup> centuries was to legislate similar enactments on wide range of goods, only adding to the effects of the grain bounties.<sup>121</sup>

Cumulatively, what these policies came to signify was more than a mere boost to national esteem as recourse to the Dutch entrepôt became less necessary and the corresponding fortunes of London waxed. Rather, by establishing a viable alternative in London, English commercial policy effectively bolstered the cause of market integration via reduced transaction costs, in two respects. Firstly, this policy allowed for the development of even more institutional innovations of the like detailed above; for instance, the development of London 'by the middle of the 18<sup>th</sup> century...[into] the most important marine insurance centre of western Europe' was directly attributable to

---

<sup>115</sup> R. Davis, *The Rise of the English Shipping Industry in the 17<sup>th</sup> and 18<sup>th</sup> Centuries*, (London, 1962) 12-3; and R.W. Unger, *Dutch Shipbuilding before 1800*, 109.

<sup>116</sup> J.E. Farnell, 'The Navigation Act of 1651,' 451.

<sup>117</sup> D. Ormrod, 'Dutch Commercial and Industrial Decline and British Growth in the Late 17<sup>th</sup> and Early 18<sup>th</sup> Centuries,' in *Failed Transitions to Modern Industrial Society: Renaissance Italy and 17<sup>th</sup> Century Holland*, eds. Krantz and Hohenberg, (Montréal, 1975) 39.

<sup>118</sup> D. Ormrod, *English Grain Exports and the Structure of Agrarian Capitalism, 1700-1760*, (Hull, 1985) 75.

<sup>119</sup> *Ibid.*, 50.

<sup>120</sup> D. Ormrod, 'Dutch Commercial and Industrial Decline,' 40.

<sup>121</sup> C. Wilson, *Anglo-Dutch Commerce and Finance in the 18<sup>th</sup> Century*, 56-62; and C. Wilson, 'The Economic Decline of the Netherlands,' *Economic History Review*, 9 (1939), 114-6.

the pursuit of 'a positive economic policy' on the part of the English government.<sup>122</sup>

This type of development painfully underlined for the Dutch an elemental lesson of the early modern era, namely that 'economic innovations are invariably short lived, fatally

123

Secondly, it also certainly contributed to a lowering in both transaction and transportation costs among London and a number of other cities in so far the situation was no longer obtaining as that in the seventeenth century when English merchants '[did] oft-times know no better way to transport their Goods to such Foreign Parts as they design, than to carry them to Amsterdam, and from thence to other places.'<sup>124</sup> Obviously, the transshipment of goods from England via Amsterdam then to the final destination was an expensive and a seemingly unnecessary process with handling and reshipment charges approaching ten per cent in many instances.<sup>125</sup> However, through the establishment of direct trading links and the development of transportation capabilities of the nation, both the need and profitability of the indirect trade through Amsterdam were increasingly put into jeopardy.<sup>126</sup>

While England may have been the first not only desirous but also capable to bypass the Dutch, in time, it was joined by a number of others. Chief among these was Hamburg which by taking advantage of its role as 'the universal neutral,' began to develop its own facilities and seize key entrepôt functions from Amsterdam.<sup>127</sup> Similarly, we see the blossoming of such cities as Bremen, Copenhagen, and Stockholm from nearly passive participants into thriving centres within the northern seas trade. Underlying all of these transformations, however, were two common elements: the adaption of state policy with the view of enhancing the productive and mercantile capabilities of the polities in question and a corresponding development of both transportation facilities and institutional innovations – along the lines detailed above – which had the result of substantially reducing transaction costs and, thus, promoting market integration.

---

<sup>122</sup> A.H. John, 'The London Assurance Company and the Marine Insurance Market,' 127, 141.

<sup>123</sup> C. Wilson, *The Dutch Republic and the Civilisation of the 17<sup>th</sup> Century*, (London, 1968) 39.

<sup>124</sup> Quoted in V. Barbour, *Capitalism in Amsterdam*, 20.

<sup>125</sup> D. Ormrod, *English Grain Exports*, 42.

<sup>126</sup> H.R.C. Wright, *Free Trade and Protection in the Netherlands*, (Cambridge, 1955) 8.

<sup>127</sup> R. Davis, *The Rise of the Atlantic Economies*, (London, 1973) 193.

## VII. CONCLUSION

As we have seen, the concept of market integration, although recently finding itself under attack, remains a highly useful one in the economic history of early modern Europe. By first strictly delineating our expectations of what the process should and should not entail, we arrived at a set of operative criteria which allowed for a fuller exploration of the process; the failure of earlier researchers in this regard now becomes more evident, casting doubts over both the inclusion of economic entities which the historical record gives us little reason to expect significant integration among and the use of only one criteria – the persistence of price differentials – as the means for appraising the (non)occurrence of market integration.

Furthermore, on the basis of our four tests for market integration, we have been able to positively conclude that market integration was indeed in effect throughout the region and time-period under consideration. These results, therefore, go far in dispelling the vision of an autarkic and disjointed Europe hobbling into the 19<sup>th</sup> century era of peace and prosperity advocated by some; and augmented with a review of the qualitative sources regarding the relation of market integration, regional specialisation, and productivity in agriculture and industry and manufacture, the results also strongly reaffirm the overwhelming role of market integration in the growth experience of the early modern era.

Finally, in the consideration of the determinants of the course of market integration, the dominant role of diminishing transaction costs in promoting market integration has been established. Additionally, two forces have been identified, namely population growth and the state, which were to have particular bearing on market integration via the diminishment of transaction costs.

Firstly, it has been asserted that the modelling of market integration as a function of population growth is a strong descriptive tool in the pre-1650 era as a result of the existence of economies of scale in the transactions sectors. Secondly, for the post-1650 era, the increasingly critical role of the state in shaping the context of international trade and market integration has been argued for; specifically, the gradual encroachment of political force on economic structures – here, the entrepôt functions of Amsterdam – have been highlighted as beneficial to the cause of market integration.



Necessarily, this interpretation is at odds with traditional accounts in which the derangement of the 'natural order' of things through government intervention was to wreak havoc on the efficient functioning of the market. Some aspects of the promulgation of tariffs, quotas, etc., undoubtedly, were detrimental to the process of market integration; however, the specific role of the state in shaping the opportunity costs and incentive structures facing producers and commercial agents alike counteracted these negative effects, allowing for ever higher levels of market integration to be achieved. This transformation culminated in the tremendous ascent of market integration dating from c. 1730/50 when the new structure of markets coupled with renewed population growth set the stage for the coming industrial revolution.

## WORKS CITED

- Abel, W. *Agrarkrisen und Agrarkonjunktur*, Berlin: Verlag Paul Parsy, 1935.
- Achilles, W. 'Getreidepreise und Getreidehandelsbeziehungen Europäischer Räume in 16. und 17. Jahrhundert,' *Zeitschrift für Agrargeschichte und Agrarsoziologie*, 7 (1959), 32-55.
- Alexander, C. and J. Wyeth. 'Cointegration and Market Integration,' *Journal of Development Studies*, 30 (1994), 303-28.
- Allen, R.C. 'The Great Divergence: Wages and Prices in Europe from the Middle Ages to the First World War,' University of British Columbia Department of Economics Discussion Paper 98-12.
- Allen, R.C. and R.W. Unger. 'The Depth and Breadth of the Market for Polish Grain, *Baltic Affairs: Relations between the Netherlands and North-Eastern Europe, 1500-1800*, eds. Lemmink and van Koningsbrugge, Nijmegen: Instituut voor Noord - en Oosteuropese Studies, 1990.
- Andersen, P. *Lineages of the Absolutist State*, London: NLB, 1974.
- Ashton, T.S. *An Economic History of England: The Eighteenth Century*, London: Methuen, 1955.
- Åström, S. 'Technology and Timber Exports from the Gulf of Finland, 1661-1740,' *Scandinavian Economic History Review*, 23 (1975), 1-14.
- Attman, A. *Dutch Enterprise in the World Bullion Trade, 1550-1800*, Uppsala: Almqvist & Wiksell, 1983.

- , Warsaw: 1962.
- Bowden, P.J. 'Agricultural Prices, Wages, Farm Profits and Rents,' in *The Agrarian History of England and Wales*, Vol. V, ed. J. Thirsk, Cambridge: Cambridge University Press, 1985.
- Braudel F.P. and F. Spooner. 'Prices in Europe from 1450 to 1750,' in *The Cambridge Economic History of Europe*, Vol. IV, eds. Rich and Wilson, Cambridge: Cambridge University Press, 1967.
- Chartres, J.A. 'Market Integration and Agricultural Output in Seventeenth-, Eighteenth-, and early Nineteenth-Century England,' *Agricultural History Review*, 43 (1995), 117-38.
- Chaudhuri, K.N. 'World Silver Flows and Monetary Factors as a Force of International Economic Integration 1658-1758,' in *The Emergence of a World Economy, 1500-1914*, Part I, eds. Fischer et al, Stuttgart: Steiner-Verlag, 1986.
- Cipolla, C. *Before the Industrial Revolution: European Society and Economy, 1000-1700*, 2<sup>nd</sup> ed., London: Methuen, 1981.
- Cole, A. and R. Crandall. 'The International Scientific Committee on Price History,' *Journal of Economic History*, 24 (1964), 381-8.
- Davis, R. *The Rise of the Atlantic Economies*, London: Weidenfeld and Nicolson, 1973.
- Davis, R. *The Rise of the English Shipping Industry in the 17<sup>th</sup> and 18<sup>th</sup> Centuries*, London: Macmillan and Co., 1962.
- Diferee, H.C. *De Geschiedenis van den Nederlandschen Handel tot den Val der Republiek*, Amsterdam: A. Akkeringa, 1908.
- Dillen, J.G. van. 'Economic Fluctuations and Trade in the Netherlands, 1650-1750,' in *Essays in European Economic History, 1500-1800*, ed. P. Earle, (Oxford: Clarendon Press, 1974.
- Dillen, J.G. van. *Van Rijkdom en Regenten: Handboek tot de Economische en Sociale Geschiedenis van Nederland Tijdens de Republiek*, 's-Gravenhage: Martinus Nijhoff, 1970.
- Du Bois, A.B. *The English Business Company after the Bubble Act, 1720-1800*, Oxford: Oxford University Press, 1938.

- Elias, J.E. *Het Voorspel van den Eersten Engelschen Oorlog*, 's-Gravenhage: Martinus Nijhoff, 1920.
- Engle, R.F. and C.W.J. Granger. 'Co-Integration and Error Correction: Representation, Estimation, and Testing,' *Econometrica*, 55 (1987), 251-76.
- Epstein, S.R. 'Cities, Regions and the Late Medieval Crisis,' *Past and Present* 130 (1991), 3-50.
- Faber, J.A. 'Friesland and the Baltic Trade,' in *From Dunkirk to Danzig: Shipping and Trade in the North Sea and the Baltic, 1350-1850*, eds. Heeres et al, Hilversum: Verloren, 1988.
- Farnell, J.E. 'The Navigation Act of 1651, the First Dutch War, and the London' *Economic History Review*, 16 (1964), 439-54.
- Feldæk, O. *Danmarks Økonomiske Historie, 1500-1840*, Herning: Systime, 1993.
- Febvre, L. Preface to H. Chaunu and P. Chaunu, *Séville et l'Atlantique, 1504-1650*, Vol. I, Paris: Lib. Armand Colin, 1955.
- Feyter, C.A. de. *Industrial Policy and Shipbuilding: Changing Economic Structures in the Low Countries, 1600-1890*, Utrecht: HES Publishers, 1982.
- Granger, C.W.J. and C.M. Elliott. 'A Fresh Look at Wheat Prices and Markets in the' *Economic History Review*, 20 (1967), 257-65.
- Gunst, P. 'Agrarian Systems of Central and Eastern Europe,' in *The Origins of Backwardness in Eastern Europe*, ed. D. Chirot, London: University of California Press, 1989.
- Harley, C.K. 'Ocean Freight Rates and Productivity, 1740-1913: The Primacy of Mechanical Innovation Reaffirmed,' *Journal of Economic History*, 48 (1988), 851-76.
- Hohenberg, P.M. 'Urban Manufactures in the Proto-Industrial Economy' in *Markets and Manufacture in Early Industrial Europe*, ed. by M. Berg, London: Routledge, 1991.
- Houtte, J.A. van. *An Economic History of the Low Countries, 800-1800*, London: Weidenfeld and Nicolson, 1977.
- The International Division of Labour: Problems and Perspectives*, ed. H. Giersch, Tübingen: J.C.B. Mohr, 1974.
- Isard, W. 'The General Theory of Location and Space-Economy,' in *Location Analysis and General Theory*, London: MacMillan, 1990.
- Israel, J.I. *Dutch Primacy in World Trade, 1585-1740*, Oxford: Clarendon Press, 1989.
- Jeannin, P. 'The Sea-borne and the Overland Trade Routes of Northern Europe in the XVIth and XVIIth Centuries,' *Journal of European Economic History*, 11 (1982), 5-59.
- John, A.H. 'English Agricultural Improvement and Grain Exports, 1660-1765,' in *Trade, Government and Economy in Pre-Industrial England*, eds. Coleman and John, London: Weidenfeld and Nicolson, 1976.
- John, A.H. 'The London Assurance Company and the Marine Insurance Market of the 18<sup>th</sup> Century,' *Economica*, 25 (1958), 126-41.
- Jones, J.R. *The Anglo-Dutch Wars of the 17<sup>th</sup> Century*, London: Longman, 1996.
- Jovanovic, M.N. *International Economic Integration: Limits and Prospects*, 2<sup>nd</sup> Ed., London: Routledge, 1998.
- Kelly, M. 'The Dynamics of Smithian Growth,' *Quarterly Journal of Economics*, 112 (1997).

Variorum, 1996.

*From the North Sea to the Baltic, Aldershot:*

- Journal of Economic History*, 33 (1973), 177-90.
- Reuter, C. *Ostseehandel und Landwirtschaft im Sechzehnten und Siebzehnten Jahrhundert*, Berlin: Mittler and Sohn, 1912.
- Ricardo, D. *The Works and Correspondence of David Ricardo*, Vol. II, ed. P. Sraffa, Cambridge: Cambridge University Press, 1951.
- Roover, F.E. de. 'Early Examples of Marine Insurance,' *Journal of Economic History*, 5 (1945), 172-200.
- Röpke, W. *International Economic Disintegration*, London: William Hodge & Co., 1942.
- Schneider, J. 'The Significance of Large Fairs, Money Markets and Precious Metals in the Evolution of a World Market from the Middle Ages to the First Half of the 19<sup>th</sup> Century,' in *The Emergence of a World Economy, 1500-1914*, Part I, eds. Fischer et al, Stuttgart: Steiner-Verlag, 1986.
- Schneider, J. and O. Schwarzer. 'International Rates of Exchange: Structures and Trends of Payments Mechanism in Europe, 17<sup>th</sup> to 19<sup>th</sup> Century,' in *The Emergence of a World Economy 1500-1914*, Part I, ed. Fischer et al, Stuttgart: Steiner-Verlag, 1986.
- Scott, W.R. *The Constitution and Finance of English, Scottish and Irish Joint-Stock Companies to 1720*, Vol. II & III, Cambridge: Cambridge University Press, 1911.

- Slicher van Bath, B.H. *Agrarian History of Western Europe*, London: Edward Allen, 1963.
- Smith, A. *Inquiry into the Nature and Causes of the Wealth of Nations*, Vol. I, ed. E Cannan, London: Butler & Tanner, 1961.
- Smith, C.A. 'Regional Economic Systems: Linking Geographical Models and *Regional Analysis, Vol. I: Economic Systems*, ed. C.A. Smith, London: Academic Press, 1976.
- Smith, C.A. 'Types of City-Size Distributions: A Comparative Analysis,' in *Urbanization in History: A Process of Dynamic Interactions*, eds. van der Woude et al, Oxford: Clarendon Press, 1990.
- Sondstrom, W. 'Evidence on Dutch-Swedish Trade in the 17<sup>th</sup> Century,' in *Baltic Affairs: Relations between the Netherlands and North-Eastern Europe, 1500-1800*, eds. Lemmink and van Koningsbrugge, Nijmegen: Instituut voor de Noord- en Oosteuropese Studies, 1990.
- Spooner, F. *Risks at Sea: Amsterdam Insurance and Maritime Europe*, Cambridge: Cambridge University Press, 1983.
- Steensgaard, N. 'The Dutch East India Company as an Institutional Innovation,' in *Dutch Capitalism and World Capitalism*, ed. M. Aymard, Cambridge: Cambridge University Press, 1982.
- Stigler, G.J. 'The Division of Labour is Limited by the Extent of the Market,' *Journal of Political Economy*, 59 (1951), 172-93.
- Szostak, R. *The Role of Transportation in the Industrial Revolution*, London: McGill-Queen's University Press, 1991.
- Thorsen, C. *Det Kongelig Oktroierede Sø-Assurance Kompagni*, Copenhagen: 1926.
- Tilly, C. 'Food Supply and Public Order in Modern Europe,' in *The Formation of National States in Western Europe*, ed. C. Tilly, Princeton: Princeton University Press, 1975.
- Tits-Dieuaide, M. 'The Baltic Grain Trade and Cereal Prices in Flanders at the end of *The Baltic Grain Trade*, ed. W. Minchinton, Exeter: Association for the History of the Northern Seas, 1985.
- Topolski, J. 'Economic Decline in Poland from the 16<sup>th</sup> to the 18<sup>th</sup> Centuries,' in *Essays in European Economic History, 1500-1800*, ed. P. Earle, Oxford: Clarendon Press, 1974.
- Ufford, H.Q. van. *A Merchant Adventurer in the Dutch Republic*, Amsterdam: VU Boekhandel, 1983.
- Unger, R.W. *Dutch Shipbuilding before 1800*, Assen: Van Gorcum, 1978.
- Unger, R.W. 'Illusory Integration: Regional, National and International Markets in Northern Europe, 1300-1900,' London School of Economics Workshop Paper.
- Unger, R.W. 'Integration of Baltic and Low Countries Grain Markets, 1400-1800,' in *The Interactions of Amsterdam and Antwerp with the Baltic Region, 1400-1800*, ed. J.M. van Winter, Leiden: Martinus Nijhoff, 1983.
- Unger, R.W. *The Ship in the Medieval Economy, 600-1600*, London: McGill-Queen's University Press, 1980.
- Urbanization in History: A Process of Dynamic Interactions*, eds. van der Woude et al, Oxford: Clarendon Press, 1990.
- Vries, J. de. *The Dutch Rural Economy in the Golden Age, 1500-1700*, New Haven: Yale University Press, 1974.

- Vries, J. de. *The Economy of Europe in an Age of Crisis, 1600-1750*, Cambridge: Cambridge University Press, 1976.
- Vries, J. de. *European Urbanization, 1500-1800*, London: Methuen, 1984.
- Vries, J. de. 'Patterns of Urbanization in Pre-industrial Europe, 1500-1800,' in *Patterns of European Urbanization since 1500*, ed. H. Schmal, London: Croom Helm, 1981.
- Vries, J. de. 'The Population and Economy of the Preindustrial Netherlands,' *Journal of Interdisciplinary History*, 15 (1985), 661-82.
- Vries, J. de and A. van der Woude. *The First Modern Economy: Success, Failure, and Perseverance of the Dutch Economy, 1500-1815*, Cambridge: Cambridge University Press, 1997.
- Wallerstein, I. 'Dutch Hegemony in the Seventeenth Century,' in *Dutch Capitalism and World Capitalism*, ed. M. Aymard, Cambridge: Cambridge University Press, 1982.
- Wallerstein, I. *The Modern World System I: Capitalist Agriculture and the Origins of the European World-Economy in the 16<sup>th</sup> Century*, London: Academic Press, Inc., 1974.
- Wallerstein, I. *The Modern World System, II: Mercantilism and the Consolidation of the European World-Economy, 1600-1750*, London: Academic Press, Inc., 1980.
- Walter, J. 'The Social Economy of Dearth in Early Modern England,' in *Famine, Disease and the Social Order in Early Modern Society*, eds. J. Walter and R. Schofield, Cambridge: Cambridge University Press, 1989.
- Walter, J. and R. Schofield. 'Famine, Disease and Crisis Mortality in Early Modern Society,' in *Famine, Disease and the Social Order in Early Modern Society*, eds. J. Walter and R. Schofield, Cambridge: Cambridge University Press, 1989.
- Wee, H. van der. *The Growth of the Antwerp Market and the European Economy*, Vol. II, 's Gravenhage: Martinus Nijhoff, 1963.
- Weir, D. 'Markets and Mortality in France, 1600-1789,' in *Famine, Disease and the Social Order in Early Modern Society*, eds. Walter and Schofield, Cambridge: Cambridge University Press, 1989.
- Willan, T.S. *River Navigation in England, 1600-1750*, London: Humphrey Milford, 1936.
- Wilson, C. *Anglo-Dutch Commerce and Finance in the 18<sup>th</sup> Century*, Cambridge: Cambridge University Press, 1941.
- Wilson, C. *The Dutch Republic and the Civilisation of the 17<sup>th</sup> Century*, London: Weidenfeld and Nicolson, 1968.
- Wilson, C. 'The Economic Decline of the Netherlands,' *Economic History Review*, 9 (1939), 111-27.
- Wilson, C. *Power and Profit*, London: Longmans, Green and Co., 1957.
- Wilson, C. 'Transport as a Factor in the History of Economic Development,' *Journal of European Economic History*, 2 (1973), 320-37.
- Wright, H.R.C. *Free Trade and Protection in the Netherlands*, Cambridge: Cambridge University Press, 1955.
- Wrigley, E.A. and R.S. Schofield. *The Population History of England, 1541-1871*, London: Edward Arnold, 1981.
- Zytkowicz, L. 'Trends of Agrarian Economy in Poland, Bohemia and Hungary from the Middle of the 15<sup>th</sup> to the Middle of the 17<sup>th</sup> Century,' in *East-central Europe*





## KÖLN

Source: D. Ebeling and F. Irsigler, *Getreideumsatz, Getreide- und Brotpreise in Köln, 1368-1797*, Köln-Wien: Boehrau-Verlag, 1976.

## KRAKOW

Sources: J. Pelc, *Ceny w Krakowie w l. 1369-1600*, Lwow, 1935.  
A. Tomaszewski, *Ceny w Krakowie w l. 1601-1795*, Lwow, 1934.

## LEIDEN

Source: N.W. Posthumus, *Nederlandsche Prijsgeschiedenis*, Vol. II, Leiden: E.J. Brill, 1964.

## LONDON

Sources: W. Beveridge, *Prices and Wages in England from the 12th to the 19th Century*, Vol. I, London: Longmans, Green and Co., 1939.  
W. Beveridge, unpublished papers in the British Library of Political and Economic Science, The London School of Economics, Box I5.  
N.S.B. Gras, *The Evolution of the English Corn Market from the 12th to the 18th Century*, London: Humphrey Milford, 1915.  
*I Prezzi in Europa*, Torino: Giulio Einaudi, 1967.  
J.E.T. Rogers, *A History of Agriculture and Prices in England*, Vol. VII.I, Oxford: Clarendon Press, 1902.

## LUBLIN

Source: A. Adamczyk, *Ceny w Lublinie od XVI do Knoca XVIII Wieku*, Lwow, 1935.

## LWOW

Sources: S. Hoszowski, *Ceny we Lwowie w l. 1701-1914*, Lwow, 1934.  
S. Hoszowski, *Les prix a Lwow (XVIe-XVIIe siecles)*, Paris: S.E.V.P.E.N., 1954.

## STOCKHOLM

Source: L. Joerberg, *A History of Prices in Sweden, 1732-1914*, Vol. I, Lund: CWK

Gleerup, 1972.

#### UTRECHT

Source: N.W. Posthumus, *Nederlandsche Prijsgeschiedenis*, Vol. II, Leiden: E.J. Brill, 1964.

#### WARSAW

Sources: A. Adamczyk, *Ceny w Warszawie w Latach XVI I XVII w.*, Lwow, 1938.  
S. Siegel, *Ceny w Warszawie w Latach, 1701-1815*, Lwow, 1936.

#### BENCHMARK

Source: The National Bureau of Economic Research Macrohistory Database  
found at

<http://www.nber.org/databases/macroeconomy/contents/index.html>;

originally derived from the following: J.E. Boyle, *Chicago Wheat Prices for Eighty-One Years*; *The Economist*, Food Research Institute, Stanford University, 'Wheat Studies,' *Monatshefte zur Statistik des Deutschen Reichs*; *Statistisches Jahrbuch*; and *Vierteljahrshefte zur Statistik des Deutschen Reichs*.

## APPENDIX II: RESULTS OF RAVALLION REGRESSIONS

{t- and F-statistics reported in brackets}

All regressions take the general form of:

$$\Delta P_{it} = (a_i - 1)(P_{it-1} - P_{1t-1}) + b_{io}\Delta P_{1t} + (a_i + b_{io} + b_{i1} - 1)R_{t-1} + cnt + e_{it} ,$$

where the dependent variable equals the change in price in the i-th market in time t, the first regressor equals the difference between the price in the i-th market in time t-1 and the price in the reference market in time t-1, the second regressor equals the

change in price in the reference market in time  $t$ , the third regressor equals the lagged value of the reference market price,  $cnt$  equals a constant, and  $e_{it}$  represents the error term.

### AMSTERDAM:

#### WITH LONDON AS THE REFERENCE MARKET

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1600-1700	-.418 [-5.7099]	.14089 [1.6382]	-.11481 [-1.7971]	.13362 [.82441]	.26224 [12.8484]
1650-1750	-.50476 [-6.5563]	.2301 [2.7137]	-.091965 [-1.2507]	.19954 [1.4634]	.33436 [17.7439]
1700-1800	-.63125 [-7.7015]	.43237 [5.0828]	-.05712 [-.65841]	.26216 [2.2014]	.5174 [34.2354]

### BRUSSELS:

#### WITH AMSTERDAM AS THE REFERENCE MARKET

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1500-1600	-0.17892 [-2.6283]	0.17757 [1.0712]	-0.017256 [-.19158]	-0.020387 [-.1199]	0.04286 [2.4777]
1550-1650	-0.2472 [-3.701]	0.13344 [.87269]	-0.26418 [-1.9276]	0.46543 [1.7927]	0.11271 [5.2341]
1600-1700	-0.39656 [-4.423]	0.41394 [4.6697]	-0.1949 [-2.7057]	0.30287 [2.2823]	0.27781 [13.8223]
1650-1750	-0.31918 [-3.9679]	0.43492 [5.0468]	-0.22411 [-3.4644]	0.35247 [2.9845]	0.31223 [16.1325]
1700-1800	-0.56883 [-4.8867]	0.6031 [6.0552]	-0.23473 [-3.5002]	0.30261 [2.4818]	0.37918 [19.934]
1500-1800	-0.19386 [-4.958]	0.33264 [4.6034]	-0.043286 [-.95797]	0.034773 [.4025]	0.11848 [14.082]

#### WITH LONDON AS THE REFERENCE MARKET

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1600-1700	-.34951 [-4.9256]	.20979 [2.5515]	-.2073 [-3.0755]	.063216 [.39949]	.24242 [11.6664]
1650-1750	-.42081 [-5.4441]	.33815 [4.3244]	-.11481 [-1.7766]	.14542 [1.2828]	.29466 [14.9252]
1700-1800	-.42887 [-4.6985]	.53514 [6.1034]	-.054652 [-.62075]	.30492 [2.6515]	.36993 [19.2008]

### KÖLN:

#### WITH AMSTERDAM AS THE REFERENCE MARKET

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1500-1600	-0.201 [-2.9736]	0.2368 [1.95]	0.01052 [.15728]	-0.0932 [-.7182]	0.068469 [3.4255]
1550-1650	-0.16555	0.11248	-0.18466	0.32306	0.077661

	[-3.0443]	[.94951]	[-1.7005]	[.32306]	[3.8067]
1600-1700	-0.30701	0.42454	-0.21841	0.38971	0.29809
	[-4.0203]	[4.9851]	[-3.1208]	[2.9671]	[15.1564]
1650-1750	-0.38608	0.49426	-0.25995	0.47143	0.42226
	[-4.7569]	[6.7252]	[-4.0488]	[3.9549]	[25.3627]
1700-1800	-0.43419	0.55495	-0.14535	0.28303	0.31965
	[-4.2862]	[5.4478]	[-1.9277]	[1.9755]	[15.565]
1500-1800	-0.069267	0.30806	-0.019329	0.027883	0.10489
	[-2.8564]	[5.0576]	[-.48365]	[.3674]	[12.406]

### WITH LONDON AS THE REFERENCE MARKET

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1600-1700	-.36261	.26658	-.11433	.078583	.26371
	[-5.1027]	[3.3874]	[-1.5237]	[.53931]	[12.9388]
1650-1750	-.37319	.24906	-.18187	.33759	.25501
	[-4.8442]	[3.1808]	[-2.2954]	[2.3254]	[12.4099]
1700-1800	-.36781	.49758	-.047604	.24513	.30789
	[-4.3236]	[5.0239]	[-.59774]	[1.7543]	[14.7908]

### LONDON:

### WITH AMSTERDAM AS THE REFERENCE MARKET

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1500-1600	-.3107	.57207	.06249	-.23826	.15356
	[-3.892]	[3.2098]	[.61438]	[-1.205]	[6.987]
1550-1650	-.367	.3645	-.35976	.71959	.21755
	[-4.6609]	[2.0353]	[-2.5635]	[2.3768]	[10.2682]
1600-1700	-.46449	.19109	-.37048	.6758	.20257
	[-4.9552]	[1.6382]	[-3.9407]	[3.8277]	[9.4676]
1650-1750	-.37835	.30667	-.25291	.44951	.18233
	[-4.0994]	[2.7137]	[-3.0986]	[2.9484]	[8.433]
1700-1800	-.35133	.51583	-.16099	.27464	.31153
	[-3.6494]	[5.0828]	[-2.3345]	[2.1069]	[15.0271]
1500-1800	-.12559	.30523	-.045419	.063081	.087552
	[-3.8534]	[3.6591]	[-.83402]	[.60693]	[10.3395]

### POLAND:

### WITH AMSTERDAM AS THE REFERENCE MARKET

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1500-1600	-.25747	.14594	-.014872	-.11557	.098173
	[-3.6965]	[.80238]	[-.1431]	[-.58865]	[4.5924]
1550-1650	-.14334	.023098	.023609	-.093193	.055682
	[-2.83]	[.10629]	[.12333]	[-.25643]	[2.9655]

1600-1700	-.14092 [-2.6583]	.046368 [.28963]	-.096443 [-.77059]	.14087 [.59511]	.040311 [2.4001]
1650-1750	-.44696 [-5.4865]	.23704 [2.1021]	-.32016 [-3.222]	.41332 [2.3881]	.23508 [11.2442]
1700-1800	-.2965 [-3.9738]	.40006 [4.075]	-.11766 [-1.4809]	.11089 [.77441]	.22626 [10.0649]
1500-1800	-.14985 [-4.8392]	.16446 [1.7969]	-.015262 [-.25491]	-.031872 [-.27907]	.071497 [8.4949]

**WITH LONDON AS THE REFERENCE MARKET**

	$(a_i - 1)$	$b_{io}$	$(a_i + b_{io} + b_{i1} - 1)$	$cnt$	R-bar <sup>2</sup>
1600-1700	-.12671 [-2.4786]	-.16084 [-1.0934]	-.33443 [-2.4796]	.58475 [2.3854]	.065245 [3.3266]
1650-1750	-.40811 [-5.1903]	.021964 [.19922]	-.45366 [-4.2099]	.67779 [3.7732]	.20169 [9.4214]
1700-1800	-.28679 [-3.996]	.21501 [2.0684]	-.10702 [-1.3155]	.11081 [.80457]	.15328 [6.6117]