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Determinants of retail trade in Croatia

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It is well known that retail trade is one of the most important parts of any economy. Retail trade is also a very important component of GDP, whereby rising retail trade means a growth in consumption and a fall in unemployment. Therefore, policy makers must be able to recognise how changes in economic variables affect changes in retail trade. The main goal of this paper is to analyse the effects of changes in retail prices, net wages and short-term interest rate on nominal retail trade in Croatia using the bounds testing (ARDL) approach for cointegration. The results indicate the existence of a stable cointegration relationship between the variables. In the long-run, an increase in retail prices and short-term interest rate leads to a reduction in nominal retail trade while an increase in net wages boosts an increase in nominal retail trade. In the short-run, a positive change in retail prices has a positive effect on the change in nominal retail trade while positive changes in net wages and short-term interest rate have negative effects on nominal retail trade.

Keywords: retail trade; cointegration; ARDL approach; Croatia

JEL classification: E21, C22

1. Introduction

Distributive trade is an important economic activity that can be defined as the totality of all forms of trade, from the procurement of goods by manufacturer to delivery to the consumer. According to Financial Agency (FINA) data, distributive trade is very important for the Croatian economy because 28.9% of businesses are operating in the distributive trade, which employs about 22.1% of the total workforce (just after manufacturing) suggesting that the distributive trade is one of the largest generators of jobs. Furthermore, the share of distributive trade in GDP in 2010 was 9.5% which further indicates its importance in the Croatian economy. Through the activity in the distributive trade, the largest number of employees in 2010 worked in the retail trade (54.66%) followed by wholesale trade (31.3%), the motor vehicles and motorcycles trade (8.53%) and in non-tradable sector (5.51%). Regarding the structure of the total turnover of the distributive trade in 2010, wholesale was prevailing with 45.17%, followed by retail trade with 37.85%,[1] wholesale and retail trade of motor vehicles and motorcycles with 8.21% while non-trade activities generated 8.77% of total turnover (EIZ, 2012; Croatian Chamber of Economy, 2012).

It is evident that retail trade is a very important part of the distributive trade. According to the Croatian Bureau of Statistics (CBS), retail trade is the sale of goods to final consumers for personal consumption or usage in households whereby retail trade is

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commonly performed within sales outlets, i.e. shops, self-service stores, department stores, rented sales space within department stores, newsstands and petrol stations. According to Kotler and Armstrong (2012, p. 374), retailing includes all activities involved in selling products or services provided directly to final consumers for their personal, non-business use. Many institutions – manufacturers, wholesalers, and retail outlets – do retailing; however, most of the retailing is done by retailers, businesses whose sales come primarily from retail selling. Dibb, Simkin, Pride, and Ferrell (1991, p. 334) state that retail trading includes all transactions in which the buyer intends to consume the product through personal, family or household use. Customers in the retail trade are final consumers while the retailer is an organisation that purchases products for the purpose of selling them to final consumers. Retail trade is commonly performed in stores and places where services are provided, but also through telephone sales, sales through vending machines and sails by mail, i.e. in the exchange outside the stores and outlets.

Over the past 20 years, trade has become one of the most developed, most competitive and most prolific industries in the Croatian economy. During the last decade, domestic trade has been marked by large investments, consumption and turnover growth, the consumer boom, the development of trade network and the concentration of market power. Therefore, overall trade activity in Croatia, including retail trade, is facing major challenges, such as an increased competition in the domestic market, concentration and acquisitions, new technologies, new forms of retail, e-commerce, internationalisation and globalisation. However, current negative trends within Croatian trade market caused by the global recession indicate that consumers changed their habits, i.e. they behave more rationally, which in turn additionally stimulates competition, concentration, consolidation, acquisitions, strategic linking and capital alliances. For example, low purchasing power affects the behaviour of consumers who tend to save and are looking for the cheapest sources of buying and favourable credit conditions (Anić, 2002). According to GFK research regarding consumers habits in retailing during 2010/2011, price is one of the most important factor in purchasing intention (Croatian Chamber of Economy, 2012). Therefore, greater benefit will be achieved by those (flexible) retailers who can quickly adapt to market conditions, i.e. altered customer preferences. A similar conclusion is reached by Pufnik and Kunovac (2012) who analysed the way in which Croatian companies determine and modify the prices of their products. Although the research did not include retail companies, the results obtained suggest that the price inertia is associated with an effort to build long-term customer business relationships, and also with customers' preferences for stable nominal prices. Increasing demand and rising costs (especially of raw materials and wages) are the main factors that affect the decision on the price increase. Furthermore, shocks affecting the changes in market conditions (demand and price competitive products) are the most important factors that influence the price cut. In addition, it is important to emphasise the significance of retail trade as it can affect these negative trends in the Croatian economy. Namely, retail trade is directly related to final customers and it is the first to experience any change in their habits; that is, retail trade must immediately respond to consumer expectations. Therefore, it is necessary to continuously encourage consumer confidence because consumption is an important link in ending and starting business cycles.[2] Future development of the Croatian distributive trade will depend on its ability to adapt to market conditions and legislation that is continuously updated in order to create a legal framework for the development of this sector. These trends are already present on European as well as on world markets, suggesting that Croatia is not lagging far behind.

Table 1. Total available assets, annual average per household (in %).

%	2003	2004	2005	2006	2007	2008	2009
Available income	86.28	87.28	88.88	87.05	89.52	88.99	91.02
Income from paid employment	51.19	52.55	51.00	45.16	46.11	46.72	54.52
Income from self-employment	17.11	16.90	16.53	13.42	14.43	13.77	14.95
Income from property *	0.23	0.42	1.01	0.75	0.91	0.92	0.88
Pensions	18.20	17.18	17.89	16.87	16.10	16.25	17.60
Transfers and other receipts **	13.27	12.95	13.58	10.85	11.98	11.35	12.06
Taken credits	10.60	8.61	7.89	9.61	7.41	8.07	7.04
Taken savings deposits	2.27	2.24	1.5	1.77	1.55	1.84	1.26
Other available assets ***	0.85	1.87	1.73	1.57	1.52	1.09	0.68
Total available assets	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Croatian Bureau of Statistics (2006, p. 185, 2007, 2010). Note: percentages are calculated using net amounts. (*) property income excludes imputed rent; (**) including remunerations related to unemployment, social transfers and other receipts; (***) including receipts from life insurance, non-life insurance, income from the sale of shares and other securities, and income from the sale of real estate or movable property.

Owing to a high correlation between retail trade and consumption,[3] but also between wages and available income, retail trade is commonly analysed within the consumption theory framework.[4] Namely, a large part of consumption expenditures refers to retail trade, while a large part of available income represents income from paid employment and self-employment (i.e. wages), as shown in Tables 1 and 2. Available income determines the structure of consumption, which is crucial for retailers supply adjustments, wherein it holds that on the limited income markets competition is stronger and the process of structural adjustment tends to accelerate (Kotler, Armstrong, Saunders, & Wong, 1999). Therefore, in determining the retail trade, the data on available and used assets can be very useful. Total available assets of the household commonly include total available income of the household, value of taken credits, open savings deposits and other available assets. The structure of total available assets of Croatian average household is shown in Table 1.

The data show that the most important source of available household assets is available income, which is followed by taken credits. Furthermore, the most significant source of available income is income from paid employment and pensions followed by income from self-employment and transfers. Likewise, it is noticeable that after 2006 the importance of taken credits decreased. This is common in times of crisis because of uncertainty (due to a possible rise in unemployment and job loss) so that households increasingly rely on other sources of income.

Table 2. Total used assets, annual average per household (in %).

%	2003	2004	2005	2006	2007	2008	2009
Consumption expenditures	84.18	82.81	84.70	82.18	82.39	79.77	81.88
Savings *	2.03	2.7	1.86	2.05	2.61	2.44	2.21
Credits with interest repayments	4.86	4.94	5.15	5.14	5.61	5.75	6.29
Investments in flats, houses and property	8.29	8.85	7.71	10.13	8.78	11.41	9.01
Other expenditure	0.64	0.7	0.58	0.50	0.61	0.62	0.61
Total used assets	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Croatian Bureau of Statistics (2006, p. 185, 2007, 2010). Note: (*) including savings deposits, life insurance and voluntary pension insurance.

On the other side, the structure of total used assets by the average Croatian household is presented in Table 2.

It is evident that average household uses most of its assets for consumption expenditures followed by investments in flats, houses and property. Following that, data also indicate a slight decline in the share of consumption expenditures and savings while the share of credits with interest repayments is rising. Such movements are common during a crisis because households due to uncertainty reduce consumption expenditures and investments including life insurances and voluntary pension insurances. The share of credits repayments with included interests has increased due to a rise in interest rates and depreciation of the exchange rate of kuna against the euro and Swiss franc, all which is de facto a result of the crises. According to CNB (Croatian National Bank) data, the share of loans to households in foreign currency or indexed to foreign currency is over 70%, whereby the major part of this is housing loans and other loans, including: general purpose loans, consumer loans and credit lines. The rest are car loans, credit card loans and mortgage loans.

Table 3 shows the turnover structure in Croatian retail trade, indicating the importance of certain activities of business entities in the retail trade.

It can clearly be seen that the largest share in turnover structure refers to non-specialised stores selling food, whereas beverages and tobacco are predominate. In addition, a large share is also held by automotive fuels and household articles, appliances, hardware and similar.

As we already mentioned, policy makers should be interested in understanding the effects of changes in certain variables on the retail trade because these changes affect GDP, employment and other relevant economic variables.[5] It is well known that an increase in GDP creates growth in economic activity, higher income, consumption and retail sales, and consequentially expansion of the retailer business. Bearing in mind that the majority of personal income is spent in retail stores, limited income, rising energy prices, increasing taxes (for example increases in the VAT rate) and high unemployment reduce the demand for goods and services provided by retailers. During recent years, the trend of increasing unemployment determined the decline in retail sales in Croatia. However, it is necessary to mention the relatively high contribution of the 'grey economy' (estimates range from 20 to 30% of GDP, see Topić, 2006), which partly compensates for the decline in retail sales. In support of this, available CNB data indicate a significant difference between the registered and ILO unemployment rate.[6] Therefore, trends and development in retailing significantly depend on the economic cycles.[7] Using economic policy measures (fiscal and monetary), policy makers should be able to affect retail trade and economic cycles. The Croatian government, using fiscal policy measures can do so by changing tax rates and import duties (affecting prices) or wages in the private sector, affecting energy prices, determining wages, pensions and other benefits in the public sector through negotiations with the labour unions and facilitation of enterprise-level wage negotiations, etc. Recently, because of the necessity to reduce the high budget deficit and to achieve budget savings, in order to mitigate the negative impact of the economic and financial crisis on the Croatian economy, the government increased taxes (e.g. VAT) and reduced wages and benefits to its employees and to employees in state-owned enterprises, reducing available income and causing a further decline in the retail trade, consumer spending and GDP.[8] So, it is clear that government measures can influence the growth of average wages, most notably in the public sector because the remaining movements in wages are caused by productivity growth and other stochastic economic factors that are not under the direct influence of government. Therefore, if

Table 3. Turnover structure in retail trade (in %).

%	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Motor vehicles, motorcycles and related parts and accessories	5.1	5.8	6.6	5.1	7.0	10.7	9.0	9.5	9.5	8.8	8.3
Automotive fuels	11.4	14.1	28.1	25.2	21.7	14.6	16.7	17.5	18.2	18.6	18.9
Non-specialised stores	43.5	44.7	35.1	38.8	41.1	40.2	40.1	39.6	40.4	37.6	38.5
Non-specialised stores with food, beverages or tobacco predominating	29.3	24.8	27.9	29.1	29.3	28.8	27.2	27.4	28.1	25.8	26.7
Other non-specialised stores	14.2	19.9	7.2	9.7	11.8	11.4	12.9	12.2	12.3	11.8	11.8
Specialised stores with food, beverages and tobacco	6.9	5.2	5.0	4.3	3.3	3.1	3.0	2.8	2.9	3.7	3.6
Pharmaceutical, cosmetic, toilet and similar articles	4.1	4.9	4.9	4.2	4.2	5.0	5.5	5.9	6.0	5.5	5.6
Other specialised stores	26.3	23.3	18.7	20.4	21.1	24.7	23.7	22.9	21.5	24.6	24.0
Textiles, clothing, footwear	6.1	5.6	4.0	3.6	4.2	5.5	5.5	5.4	5.4	4.7	4.6
Household articles, appliances, hardware, and similar	11.0	9.7	6.9	6.4	7.5	10.6	8.9	8.6	8.5	10.0	9.8
Other specialised stores	9.2	8.0	7.8	10.4	9.4	8.6	9.3	9.0	7.6	9.9	9.6
Retail sale not in stores	2.7	2.0	1.6	2.0	1.6	1.7	2.0	1.7	1.5	1.2	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Croatian Bureau of Statistics (2003, 2006, p. 398, 2009).

average wages affect retail sales, fiscal policy measures aimed at increasing or decreasing consumption spending may yield results (Cziráky, 2002). Finally, Croatian membership of the European Union decreased the significance of import duties. On the other hand, monetary policy should affect the level of domestic interest rates on loans intended for consumption. However the effects of CNB monetary policy regarding domestic interest rates are rather limited because of the necessity of preserving exchange rate and price stability. In this context it is important to note that monetary policy can affect import prices and thus domestic prices (including retail prices) by managing the exchange rate, especially in a small, open and highly import-dependent country. For example, domestic prices will be lower if the exchange rate appreciates and, conversely, domestic prices will be higher if the exchange rate depreciates. And finally, retail prices will be lower if company management and workers are more educated, more effective in planning and executing tasks, if they implement new technologies, etc.

The rest of the paper is organised as follows. Section 2 refers to the literature review, Section 3 refers to the empirical analysis and results while Section 4 gives a conclusion.

2. Literature review

A literature review concerning empirical studies of retail trade is given here. First, there is a brief overview of the literature related to the importance of the exchange rate stability in small and open countries such as Croatia, and then an overview follows of the literature related to the retail trade.

Using different measures of volatility, Calvo and Reinhart (2002) analysed the behaviour of exchange rates, reserves, and interest rates for 39 emerging market countries in Africa, Asia, Europe, and the Western Hemisphere using monthly data from 1970 to 1999 to assess whether there is evidence that countries move to corner exchange rate solutions – hard pegs or floating exchange rates (i.e. fixed or flexible exchange rate regimes). The provided evidence suggests that the fear of floating is widespread and cuts across regions and levels of development, suggesting that floating is not a suitable strategy for developing economies. On the other side, this is not the case in large and developed economies such as the US, Japan and Australia. Finally, it should be noted that the stabilisation of the exchange rate is very important for countries that have inflation targets or credibility problems and a high pass-through from exchange rates to prices, as is often the case with emerging markets.

Billmeier and Bonato (2002) analysed the monetary policy in Croatia (as a highly dollarized[9] economy when wages and prices are indexed to the exchange rate) emphasising that CNB was very successful in reducing inflation by using the exchange rate as the nominal anchor, bearing in mind that Croatia is a small and open economy, further implying that Croatia is a price taker in the world market. Using the VAR (vector autoregressive) model, the cointegration approach and monthly data in the period from 1994 to 2001, they tested the exchange rate pass-through, i.e. how exchange rate movements pass through to domestic inflation by changing the price of tradables expressed in domestic currency and thus affecting domestic activity. VAR model results showed that although the intermediate price index initially seems to respond significantly to exchange rate movements as well as to movements in commodity prices, the retail price index does not. Results based on cointegration showed that in the long run the pass-through from the exchange rate to the intermediate price index cannot be captured, but

it is captured for the retail price index. However, they conclude that policy implications are unclear due to the endogeneity of the pass-through to the policy regime.

Foster, Haltiwanger, and Krizan (2006) analysed the market selection, reallocation and restructuring in the US retail trade sector during 1990s with accompanying technological advances (such as improvements in inventory control, use of scanners and rapid credit card processing technologies). Using regression analysis and a data-set from 1987, 1992 and 1997 of establishments in the US retail trade sector, they quantified and explored the relationship between restructuring, reallocation and labour productivity dynamics. The evidence suggests that aggregate productivity dynamics in the US retail trade are driven by the reallocation of inputs and outputs from less productive to more productive establishments.

Netessine, Fisher and Krishnan (2010) used cross-sectional analysis and private data provided by a large retail chain of 230 stores in two closely located metropolitan areas in the US over two years to assess the relationship between labour planning and execution practices and the average transaction (basket) value of a retail store location. Supposing that the basket values of a retail store should be positively associated with the quality of labour planning and execution of the plan, they found that consumer basket value varies greatly from store to store and that there is a strong cross-sectional association between labour practices at different stores and basket values. Further separating the task of labour management into the planning component and the execution components, they found that stores with better plans and stores with better execution of these plans for full-time employees demonstrate significantly higher basket values. Other obtained results show that customer demographics play an important role in determining the financial success of a store. Finally, it can be concluded that improvements in employee scheduling and in execution of the schedule can result in higher sales at moderate, or even no, additional cost.

Using correlations and regressions, Ton and Huckman (2008) investigated the impact of employee turnover on operating performance in settings that require high levels of knowledge exploitation. Using monthly turnover data from 1999 to 2002 from 268 US stores of a major retail chain (from a retailer of entertainment products such as books, CDs and DVDs), they found that, on average, employee turnover is associated with decreased performance, as measured by profit margin and customer service. The effect of turnover on performance, however, is mitigated by the nature of management at the store level. At high-process-conformance stores, managers use discipline in implementing standardised policies and procedures, whereas at low-process-conformance stores, managers tolerate deviations from these standards. They further found that increasing turnover does not have a negative effect on store performance at high-process-conformance stores; at low-process-conformance stores, the negative effect of turnover is pronounced. Consequently, results suggest that, in settings where performance depends on the repetition of known tasks, managers can reduce turnover's effect by imposing process discipline through standard operating procedures.

Using correlations, regressions and data collected from a four-year longitudinal study from 1999 to 2002 of 333 US stores of a large retailer (a chain of books and music superstores), Ton and Raman (2004) showed that increasing product variety and inventory level per product is associated with an increase in misplaced products. Consequently, increasing misplaced products at a store is associated with a decrease in store sales, i.e. misplaced products lead to lost sales, and hence, affects store profitability.

The above clearly indicates that retail may also be affected by some internal (i.e. micro) factors. For example, if a company management and workers are more educated

and effective in planning and executing tasks, or if a company implements new technologies, then its retail prices should be lower and thus a company will be more competitive on the market, which will in turn increase its retail and profit margin.

Chopin and Darrat (2000) using a flexible lag structure and a multivariate model studied Granger causal relationships within US monthly data of consumer attitudes and several macro variables, i.e. retail sales, personal disposable income, inflation, stock prices, money supply, and interest rates. Obtained results suggested that only the behaviour of the stock market (approximated by the changes in the Dow Jones Industrial Average Index) causes significant changes in retail sales. However, the analysis indicated the possibility that consumer attitudes can influence retail sales indirectly through interactions with the Dow Jones Industrial Average Index.

Dore and Singh (2009) highlighted the importance of credit in maintaining US retail sales from 1992 to 2007 using a maximum likelihood regression where retail sales were regressed with variables such as revolving credit, non-revolving credit and disposable income. The analysis showed that revolving credit and non-revolving credit accounted for approximately 50% of retail sales while influence of disposable income was very modest.

Furthermore, Dore and Singh (2010) using US quarterly data analysed the relationship between aggregate spending (i.e. retail sales as a proxy for aggregate spending), credit, disposable income and profits using a vector error correction model (VECM) and Granger causality tests. Granger causality tests showed that disposable income and revolving credit Granger cause aggregate spending (i.e. retail sales). On the other hand, aggregate spending Granger causes corporate profits and disposable income. The VECM confirmed that aggregate spending depends on disposable income and vice versa. Furthermore, disposable income increases the availability of credit, which then increases spending. Finally, aggregate spending raises profits, which in turn raise disposable income.

Retail trade can be analysed at the regional level as well, considering regional characteristics and features. Consequently, Barker, Bryant, Glass, Wehmeyer, and Domazlicky (2001) analysed the determinants of retail trade sector in southeast Missouri counties (US) stating that the retail trade sector is important to the economic fortunes of a region, claiming that a declining retail trade sector causes loss of jobs and tax revenues. Analysis showed that a county's trade sector, as measured by its pull factor, increases as its per capita income, population and in-commuting increase, and decreases with higher unemployment rates.

The analysis of retail trade can be done on the level of the individual retailer considering its significance within the overall retail trade. For example, Jantzen, Pescatrice, and Braunstein (2009), using monthly data, investigated whether there exists a significant long-run relationship between the Wal-Mart business and the overall US economy as measured by an array of traditional macro-level variables (production, income, credit, employment, prices, and confidence). The results showed that Wal-Mart's business moves counter to general economic conditions, quickening in slow growth periods and stagnating when the economy prospers. Causality tests showed that Wal-Mart's business not only responds to the condition of the overall economy, but also influences the aggregate economy.

In addition, retail trade can be analysed at the level of individual products. For example, the analysis may include different sectors such as: meat (beef, lamb, pork, and so on), milk, potatoes, fresh vegetables, etc.

In the following we will present a literature review that covers previous studies on retail trade in Croatia, indicating that the number of empirical studies and analysis in Croatia is relatively scarce.

Belullo (1999) analysed the impact of changes in the money supply on the real economic activity in Croatia. Using monthly data and Johansen cointegration analysis, a cointegration relationship is found between the retail trade turnover and consumer prices. Furthermore, a cointegration relationship is found between the money supply and retail prices, raising the possibility that money supply affects retail trade turnover through consumer prices.

Cziráky (2002) estimated an autoregressive distributive lag (ADL) model based on the 'general-to-specific' econometric methodology between Croatian monthly retail sales and average wages, identifying a stable cointegration relationship and concluding that wage policy can influence consumption in Croatia. Additionally, the effect of average interest rate on deposits on retail sales was tested via a Lagrange multiplier (LM) test for omitted variables. Result showed that the interest rate is insignificant and therefore was omitted from further analysis.

Anić (2002) investigated the relationship between the retail trade and the economic environment in Croatia, noting that the growing rates of GDP and earnings contribute to the growing consumption and retail sales. However, low purchasing power and unsatisfactory (insufficient) growth of GDP limit further growth of GDP and retail sales. The ordinary least squares (OLS) model based on annual data suggested that an increase in GDP leads to an increase in retail trade. Strong correlation is also found between net wages, consumption and retail trade, whereby rising incomes contribute to growing consumption and retail trade. Additionally, it is found that consumers are looking for the cheapest purchasing sources, which intensify the price competition, consolidation of companies and concentration of market shares i.e. market power in the retail trade sector.

Anić and Nušinović (2003) analysed structural changes in the Croatian retail sector in the period from 1998 to 2001. Using correlation analysis they showed that the level of retail turnover per capita is strongly correlated with GDP per capita. The results of their analysis also supported the hypotheses that the Croatian retail market has been characterised with dynamic changes and growing effectiveness.

Brčić-Stipčević and Renko (2004) analysed the impact of the transition and the EU accession process on the development of Croatian retailing. Their analysis emphasised a strong correlation between retail trade, consumption, wages, household loans and central bank instruments.

Arnerić, Jurun, and Kordić (2009) using the ordinary least squares method (OLS) estimated a real trade turnover in Croatia using monthly data of real trade turnover, average real wages and household loans. Hence, they found that real average wages have a negative effect on real trade turnover while household loans have a positive effect. However, the effect of average real wages has been found to be statistically insignificant. Finally, they estimated a model without real average wages.

Sorić and Marković (2010) estimated a vector autoregressive (VAR) model to detect if Croatian business and consumer survey indicators can serve as leading (predictive) indicators of Croatian macroeconomic variables. Using Granger causality tests they found a negative and significant relationship between quarterly data of the retail trade volume and the consumer sentiment indicator (which includes consumers' perceptions and expectations), suggesting that while the consumer sentiment indicator is increasing (meaning higher consumer sentiment) the rate of change of retail trade volume is decreasing.

3. Empirical analysis and the results

The main goal of this paper is to analyse the effects of changes in retail prices (PRICE), net wages (WAGE)[10] and short-term interest rate (INT)[11] on nominal retail trade (TRADE) in Croatia. For this purpose the autoregressive distributed lag (ARDL) modelling approach is used.[12] Data are analysed on a quarterly base from March 1996 to June 2012. Their trend can be perceived within Figure 1. All data are obtained from the Croatian Bureau of Statistics (CBS) (http://www.dzs.hr) and the Croatian National Bank's (CNB) (http://www.hnb.hr/publikac/hpublikac.htm) official websites.

Both retail trade and net wages showed strong upward trend until 2008, after which the magnitude is slowed due to a spillover effect of the global crisis on the Croatian economy. Retail prices on the other hand achieved strong upward trend throughout the whole observed period. Such a strong rise in retail prices is primarily caused by the increase in food and energy prices. Finally, the short-term interest rate on kuna credits to households showed a downward trend throughout the whole period. Despite the declining trend, it is evident that the short-term interest rate is still on a relatively high level.

To estimate the retail trade equation the ARDL modelling approach is used. Due to its advantages, the approach was popularised with the works of Pesaran, Shin, and Smith (1996) and Pesaran and Shin (1999). The main advantage of this approach is that it can be applied irrespective of whether the regressors are I(0) or I(1) and can avoid the pre-testing problems associated with the standard cointegration analysis, which requires identification of the order of integration. Therefore, and in contrast to other

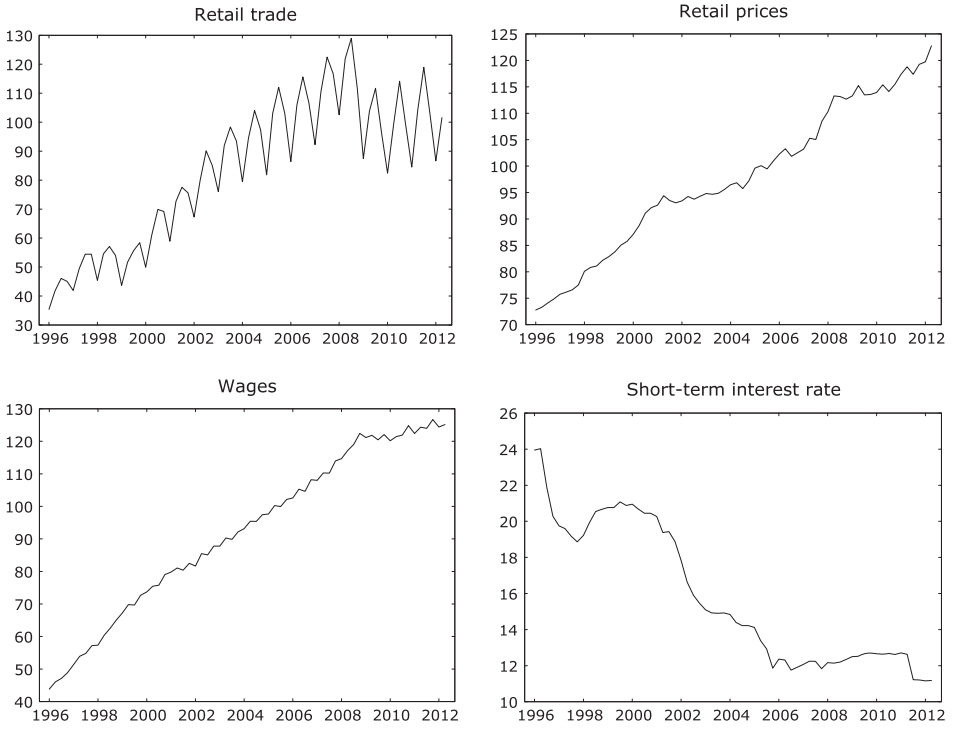

Figure 1. Nominal retail trade index, retail price index, average net wages index, short-term interest rate on kuna credits to households not indexed to foreign currency (all variables are expressed in indices (2005=100), except short-term interest rate, which is expressed in percentage). Source: CBS and CNB.

approaches of cointegration, this method has the advantage of rendering pre-stage unit root tests unnecessary, which are known for their poor confirmation power.

According to Pesaran et al. (1996), Pesaran and Shin (1999) and as summarised in Belke and Polleit (2004), the ARDL model is performed in three steps. The first step starts with conducting the bounds test for cointegration. In the second step, when cointegration is found, the long-run relationship is estimated. When there is a long-run relationship between variables, there exists an error correction specification. Therefore, in the third step, the error correction model (ECM) is estimated.

Before proceeding with the bounds test, it is necessary to examine the properties of the time series, i.e. the degree of integration because it is very important to determine whether the variables are integrated of order $n = 0, 1, 2$ as to avoid spurious results. In the presence of I(2) variables the computed F-statistic is not valid because the bounds test is based on the assumption that the variables are I(0) or I(1). To do so, the Augmented Dickey-Fuller ADF test (Dickey & Fuller, 1979), Phillips and Perron PP test (Phillips & Perron, 1988) and KPSS test (Kwiatkowski, Phillips, Schmidt, & Shin, 1992) are considered. The difference between the ADF (and PP test) and KPSS test is in the formulation of the null hypothesis. The ADF test has a non-stationarity as a null hypothesis, i.e. the null hypothesis is based on the assumption that the analysed variable has a unit root, while in the KPSS test we assume that the variable is stationary. To eliminate the influence of seasonal factors, all series were seasonally adjusted.[13] Furthermore, all variables are expressed in their logarithmic form except the short-term interest rate. The results of the unit root tests are shown in Table 4.

Although some results in Table 4 indicate that net wages are stationary in levels, insight into Figure 1 and the results of other unit root tests confirm that all the variables, including net wages, are integrated of order I(1), i.e. they are stationary in their first differences.

Table 4. Unit root tests.

	Level		First difference	
Variable and test	Constant	Constant and trend	Constant	Constant and trend
ADF test		t-stat.		
LTRADE	2.760067	−0.176547	−5.867834	−6.770518
LPRICE	−1.523022	−2.334915	−5.709416	−5.831929
LWAGE	−9.721370	−3.049344	−1.737857	−6.630946
INT	−1.889445	−2.075898	−4.665067	−4.786427
PP test		Adj. t-stat.		
LTRADE	−2.530691	−0.521055	−6.146263	−6.918443
LPRICE	−1.674865	−2.162677	−5.801577	−5.901996
LWAGE	−8.759342	−2.844473	−3.957759	−6.727617
INT	−1.834254	−2.144678	−4.705384	−4.896815
KPSS test		LM-stat.		
LTRADE	0.926428	0.247000	0.517748	0.061685
LPRICE	1.027901	0.141481	0.221830	0.074892
LWAGE	1.008085	0.242060	0.849458	0.157249
INT	0.973725	0.147480	0.162065	0.057259

Source: Authors' calculation. Note: *L* indicates logarithm of the variable. For the implementation of ADF test the Schwarz Bayesian criterion has been implemented. ADF test critical values (MacKinnon, 1996); constant: 1% level (–3.49), 5% level (–2.89), 10% level (–2.58); constant and trend: 1% level (–4.04), 5% level (–3.45), 10% level (–3.15). PP test critical values (MacKinnon, 1996): constant: 1% level (–3.49), 5% level (–2.89), 10% level (–2.58); constant and trend: 1% level (–4.04), 5% level (–3.45), 10% level (–3.15). KPSS asymptotic critical values (Kwiatkowski-Phillips-Schmidt-Shin, 1992); constant: 1% level (0.739), 5% level (0.463), 10% level (0.347); constant and trend: 1% level (0.216), 5% level (0.146), 10% level (0.119).

As stated before, the first step of the ARDL approach starts with conducting the bounds test for cointegration. Therefore, the long-run relationship between the variables is tested by computing the *F*-statistic for testing the significance of the lagged levels of the variables in the error correction form of the underlying ARDL model. For these purposes, Pesaran et al. (1996) have tabulated the critical values for a different number of regressors (k) considering the model could include an intercept and/or trend. The testing procedure starts with conducting the bounds test for the null hypothesis of no cointegration.

Pesaran et al. (1996) proceed from a general vector autoregressive (VAR) model in the (k+1) – vector z_t:

$$z_t = b + ct + \sum_{i=1}^{p} \varphi_i z_{t-i} + \varepsilon_t, t = 1, 2, \ldots, T \tag{1}$$

where b is a (k+1)-vector of intercepts, c is a (k+1)-vector of trend coefficients. Assuming the absence of seasonal and explosive roots the following unrestricted vector error correction model (VECM) is derived from equation (1) as:

$$\Delta z_t = b + ct + \Pi z_{t-1} + \sum_{i=1}^{p} \Gamma_i \Delta z_{t-i} + \varepsilon_t, t = 1, 2, \ldots, T \tag{2}$$

where Δ is first difference operator, the (k+1) × (k+1) – matrices $\Pi = -I_{k+1} + \sum_{i=1}^{p} \Phi_i$ and $\Gamma_i = -\sum_{j=i+1}^{p} \Phi_j$, $i = 1, 2, \ldots, p$–1 contain long-run multipliers and short-run dynamic coefficients of the VECM. After partitioning equation (2) into a dependent variable y_t and a vector of 'forcing' variables x_t with $\varepsilon_t = (\varepsilon_{1t}, \varepsilon'_{2t})'$, it is further assumed that there exists only one long-run relationship. Along with the assumption that the error vector ε_t follows a multivariate identically and independently distributed zero mean process with a non-singular variance matrix, finite fourth-order moments and contemporaneous correlation between ε_{1t}, ε'_{2t} of the form $\varepsilon_{1t} = w'\varepsilon_{2t} + \xi_t$, where $w = \sum_{22}^{-1} \sigma_{21}$ and $\{\xi_t\}$ represents an iid $(0; \sigma_{\xi}^2)$−process uncorrelated with $\{\varepsilon_{2t}\}$. The process ends up with the following 'unrestricted' ECM:

$$\begin{aligned} \Delta y_t =& a_{0y} + a_{1y} t + \varphi y_{t-1} + \delta_1 x_{1,t-1} + \delta_2 x_{2,t-1} + \ldots + \delta_k x_{k,t-1} \\ &+ \sum_{i=1}^{p-1} \Psi_i \Delta y_{1,t-i} + \sum_{i=0}^{q_1-1} \phi_{i1} \Delta x_{1,t-i} + \sum_{i=0}^{q_2-1} \phi_{i2} \Delta x_{2,t-i} + \ldots + \sum_{i=0}^{q_k-1} \phi_{ik} \Delta x_{k,t-i} + \xi_{ty} \\ &for\ all\ t = 1, 2, \ldots, T \end{aligned} \tag{3}$$

where φ and δ are the long-run multipliers, ψ and φ are the short-run dynamic coefficients, (p, q) are the order of the underlying ARDL model (where p refers to y and q refers to x), t is a deterministic time trend, k is the number of 'forcing' variables, and ξ is uncorrelated with the Δx_t and the lagged values of x_t and y_t.

Since the observations are quarterly, the maximum order of lags in the ARDL model is 4. Furthermore, the trend is not included.[14] The error correction version of the ARDL model is defined as follows:

$$\begin{aligned} \Delta LTRADE_t = \alpha_0 &+ \sum_{i=1}^{4} \psi_i \Delta LTRADE_{t-i} + \sum_{i=1}^{4} \phi_{i1} \Delta LPRICE_{t-i} + \sum_{i=1}^{4} \phi_{i2} \Delta LWAGE_{t-i} \\ &+ \sum_{i=1}^{4} \phi_{i3} \Delta INT_{t-i} + \delta_1 LTRADE_{t-1} + \delta_2 LPRICE_{t-1} + \delta_3 LWAGE_{t-1} \\ &+ \delta_4 INT_{t-1} + u_t. \end{aligned} \tag{4}$$

where all variables are as previously defined. The current values of *DLPRICE*, *DLWAGE* and *DINT* are excluded since it is not possible to know a *priori* whether *LPRICE*, *LWAGE* and *INT* are the 'long-run forcing' variables for nominal retail trade (*LTRADE*).

Next, the *F*-test is conducted for the joint hypothesis that the lagged levels of the variables in equation (4) are zero:

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0 \tag{5}$$

against the alternative hypothesis that at least one lagged level variable is non-zero:

$$H_1 : \delta_1 \neq 0,\ \delta_2 \neq 0,\ \delta_3 \neq 0,\ \delta_4 \neq 0 \tag{6}$$

Computed *F*-statistics should be compared with the critical values in Pesaran et al. (1996). Two sets of asymptotic critical values are provided; one set assuming that all the regressors are I(1) and another set assuming that they are all I(0). If the computed *F*-statistic exceeds the upper critical value, the null hypothesis of no long-run relationship can be rejected and if it falls below the lower critical value, the null hypothesis of no long-run relationship can be accepted. Finally, if it falls between these two critical values, the result is inconclusive. Table 5 summarises the results of the computed *F*-statistics when each variable in equation (4) is considered as a dependent variable.

Since the *F*(*LTRADE* | *LPRICE*, *LWAGE*, *INT*) = 4.60 exceeds the upper bound, the null hypothesis of no long-run relationship between *LTRADE*, *LPRICE*, *LWAGE* and *INT* can be rejected irrespective of the order of their integration. This analysis will continue with the usage of *LTRADE* as a dependent variable since the primary goal is to analyse the effects of changes in retail prices, net wages and short-term interest rate on nominal retail trade. The results also suggest that *LPRICE*, *LWAGE* and *INT* can be treated as the 'long-run forcing' variables for the explanation of nominal retail trade (*LTRADE*).

In the second step, the ARDL (p, q_1, q_2,…, q_k) long-run model is estimated as:

$$\varphi(L,\ p)y_t = \sum_{i=1}^{k} \beta_i(L,\ q_i)x_{it} + \delta' w_t + u_t \tag{7}$$

where

$$\varphi(L,\ p) = 1 - \varphi_1 L - \varphi_2 L^2 - \ldots - \varphi_p L^p,$$

$$\beta_i(L,\ q_i) = 1 - \beta_{i0} - \beta_{i1} L - \ldots - \beta_{iq_i} L^{q_i}, for\ i = 1, 2, \ldots, k \tag{8}$$

Table 5. Results from bounds tests.

Dependent variable	Lags	F-statistic	*p*-value
F(*LTRADE* | *LPRICE*, *LWAGE*, *INT*)	4	4.60064[c]	0.00376706***
F(*LPRICE* | *LTRADE*, *LWAGE*, *INT*)	4	3.36878[b]	0.0181628**
F(*LWAGE* | *LTRADE*, *LPRICE*, *INT*)	4	7.38934[c]	0.000148595***
F(*INT* | *LTRADE*, *LPRICE*, *LWAGE*)	4	1.71931[a]	0.164744

Source: Authors calculation. Note: *L* indicates logarithm of the variable. (a) indicates that the statistic lies below the 95% lower bound, (b) that it falls within the 95% bounds, and (c) that it lies above the 95% upper bound. Since $k = 3$, the 95% critical value bounds for Case II (intercept and no trend) are I(0) = 3.219; I(1) = 4.378.
(***) indicates statistical significance at the 1% level
(**) indicates significance between 1% and 5%
(*) indicates significance between the 5% and 10% levels.

where L is a lag operator ($Ly_t = y_{t\text{-}1}$). The variable w_t represents a $s \times 1$ vector of deterministic variables. Equation (7) is then estimated by ordinary least squares (OLS) using one of the following criteria: the $\bar{R}^2$ (R-bar squared) criterion, Akaike information criterion (AIC), Schwarz Bayesian criterion (SBC) and Hannan and Queen criterion (HQC). The long-run coefficients for the response of y_t to a unit change in x_{it} are estimated by:

$$\hat{\theta}_i = \frac{\hat{\beta}_i(1,\ \hat{q}_i)}{\hat{\varphi}(1,\ \hat{p})} = \frac{\hat{\beta}_{i0} + \hat{\beta}_{i1} + \ldots + \hat{\beta}_{i\hat{q}_i}}{1 - \hat{\varphi}_1 - \hat{\varphi}_2 - \ldots - \hat{\varphi}_{\hat{p}}}, i = 1, 2, \ldots, k \tag{9}$$

where $\hat{p}$ and $\hat{q}_i$, $i = 1, 2,\ldots, k$ are the selected (estimated) values of p and q_i, $i = 1, 2,\ldots, k$. The long-run coefficients associated with the deterministic variables with fixed lags are estimated by:

$$\hat{\psi} = \frac{\hat{\delta}(\hat{p},\ \hat{q}_1,\ \hat{q}_2, \ldots,\ \hat{q}_k)}{1 - \hat{\varphi}_1 - \hat{\varphi}_2 - \ldots - \hat{\varphi}_{\hat{p}}} \tag{10}$$

where $\hat{\delta}(\hat{p},\ \hat{q}_1,\ \hat{q}_2, \ldots,\ \hat{q}_k)$ denotes the OLS estimate of δ in equation (7) for the selected ARDL model.

Table 6 shows the results of the ARDL (p_1, q_1, q_2, q_3) model selected using the SBC criterion.[15]

Table 6. Autoregressive distributed lag estimates – ARDL (1, 2, 3, 1) selected based on Schwarz Bayesian criterion.

Dependent variable: *LTRADE*				
	Coefficient	Std. Error	t-ratio	*p-value*
Const	1.74575	0.499574	3.4945	0.00099***
$LTRADE_1$	0.881375	0.0517094	17.0448	0.00001***
LPRICE	0.229413	0.419476	0.5469	0.58683
$LPRICE_1$	0.902967	0.68562	1.3170	0.19372
$LPRICE_2$	−1.57749	0.468101	−3.3700	0.00144***
LWAGE	0.124545	0.39853	0.3125	0.75593
$LWAGE_1$	−0.631086	0.529077	−1.1928	0.23847
$LWAGE_2$	−0.178171	0.506583	−0.3517	0.72650
$LWAGE_3$	0.885825	0.35266	2.5118	0.01522**
INT	−4.45577	0.907028	−4.9125	0.00001***
INT_1	3.97444	0.854943	4.6488	0.00002***

Mean dependent var.	4.418783	S.D. dependent var.	0.283290
Sum squared resid.	0.027003	S.E. of regression	0.023010
R-squared	0.994484	Adjusted R-squared	0.993403
F(10, 51)	919.5018	P-value(F)	6.44e-54
Log-likelihood	151.9334	Akaike criterion	−281.8668
Schwarz criterion	−258.4683	Hannan-Quinn	−272.6800
rho	0.021487	Durbin's h	0.183441

Source: Authors calculation. Note: L indicates logarithm of the variable.
(***) indicates statistical significance at the 1% level
(**) indicates significance between 1% and 5%
(*) indicates significance between the 5% and 10% levels.

Table 7 summarises the diagnostic tests of the selected ARDL (1, 2, 3, 1) retail trade equation.

Diagnostic tests suggest that the model is adequately estimated and that the conclusions of the model are acceptable. Furthermore, CUSUM and CUSUMQ plots are presented in Figure 2 and do not show significant breaks of the estimated ARDL (1, 2, 3, 1) model indicating that there exists a stable retail trade function over the sample period.

The level relationship, i.e. the long-run ARDL (1, 2, 3, 1) retail trade equation is presented in Table 8.

All estimated coefficients are statistically significant and have theoretically expected signs. It is evident that an increase in retail prices and short-term interest rate leads to a decrease in nominal retail trade while an increase in net wages leads to an increase in nominal retail trade. Calculated *t*-ratios suggest that retail prices are the most significant factor in determining the nominal retail trade equation, which is followed by net wages and short-term interest rate. Although it is known that the interest rate on short-term (consumer) loans should be insensitive to cyclical movements (Rose, 2005), it is possible to notice a relatively high coefficient next to interest rate. However, its significance is modest compared with others. Such a relatively high coefficient is not a surprise if we analyse Figure 1. Namely, we can perceive a sharp decline in the short-term interest rate in the whole period, which obviously affects consumption. Furthermore, the impact

Table 7. Diagnostic tests of the ARDL (1, 2, 3, 1) retail trade equation.

Serial correlation	LM test: LMF = 0.915142, *p*-value = P(F(4, 47) > 0.915142) = 0.463021 Alternative statistic: TR^2 = 4.479921, *p*-value = P(Chi-square(4) > 4.47992) = 0.345 Ljung-Box test: Q' = 4.13335, *p*-value = P(Chi-square(4) > 4.13335) = 0.388
Normality	Chi-square(2) = 1.84786, *p*-value = 0.396956
Heteroscedasticity	Chi-square(1) = 1.4151, *p*-value = 0.234
ARCH	LM = 8.74019, *p*-value = P(Chi-square(4) > 8.74019) = 0.067932
Structural break	QLR test: max F(10, 41) = 4.60518 at observation 2002:3 (1% critical value = 3.23)
Parameter stability	CUSUM test: Harvey-Collier t(50) = −1.38247, *p*-value = P(t(50) > −1.38247) = 0.172971
Non-linearity	Ramsey's RESET test: F(2, 49) = 0.69168, *p*-value = P(F(2, 49) > 0.69168) = 0.505556

Source: Author's calculation.

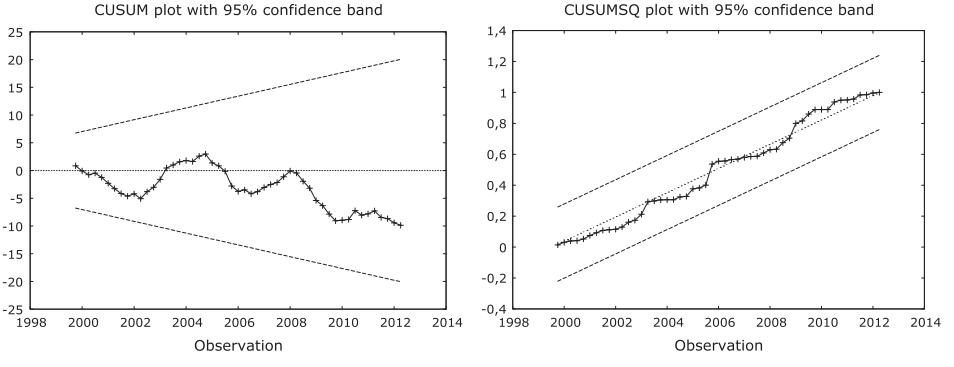

Figure 2. Plot of CUSUM and CUSUMQ (stability test) with 95% confidence intervals.
Source: Author's calculation.

Table 8. Estimated long-run coefficients of the ARDL (1, 2, 3, 1) retail trade equation.

Dependent variable: LTRADE	Coefficient	Std. Error	t-ratio	*p-value*
Const	14.7166	4.7959	3.0686	0.003***
LPRICE	−3.7523	1.4471	−2.5930	0.012**
LWAGE	1.6954	0.68847	2.4625	0.017**
INT	−4.0576	1.7296	−2.3459	0.023**

Source: Author's calculation. Note: *L* indicates logarithm of the variable.
(***) indicates statistical significance at the 1% level
(**) indicates significance between 1% and 5%
(*) indicates significance between the 5% and 10% levels.

of net wages on retail trade is significantly higher compared with the results of Cziráky (2002) but the estimated period is rather different and data are monthly based. Arnerić et al. (2009) found that real average wages have an insignificant negative effect on real trade turnover in Croatia while household loans have a significant positive effect. The result related to the effect of household loans on real trade turnover can be partly compared with the results of this study if we assume that a decrease in interest rates leads to an increase in the amount of household loans, which in turn increases real trade turnover.

In the third step, the error correction model associated with the ARDL $(\hat{p},\ \hat{q}_1,\ \hat{q}_2, \ldots,\ \hat{q}_k)$ model can be estimated by writing equation (7) in terms of the lagged levels and the first differences of y_t, x_{1t}, x_{2t}, …, x_{kt}, and w_t. Considering that:

$$y_t = \Delta y_t + y_{t-1}$$

$$.y_{t-s} = y_{t-1} - \sum_{j=1}^{s-1} \Delta y_{t-j}, s = 1, 2, \ldots, p.$$

and

$$\begin{aligned} w_t &= \Delta w_t + w_{t-1} \\ x_{it} &= \Delta x_{it} + x_{i,t-1} \\ x_{i,t-s} &= x_{i,t-1} - \sum_{j=1}^{s-1} \Delta x_{i,t-j}, s = 1, 2, \ldots, q_i. \end{aligned} \tag{11}$$

Substituting these relations into equation (7):

$$\Delta y_t = -\varphi(1,\ \hat{p}) EC_{t-1} + \sum_{i=1}^{k} \beta_{i0} \Delta x_{it} + \delta' \Delta w_t - \sum_{j=1}^{\hat{p}-1} \varphi_j^* \Delta y_{t-j} - \sum_{i=1}^{k} \sum_{j=1}^{\hat{q}_i - 1} \beta_{ij}^* \Delta x_{i,t-j} + u_t \tag{12}$$

with the error correction term:

$$EC_t = y_t - \sum_{i=1}^{k} \hat{\theta}_i x_{it} - \hat{\psi}' w_t$$

Note that $\varphi(1,\ \hat{p}) = 1 - \hat{\varphi}_1 - \hat{\varphi}_2 - \ldots - \hat{\varphi}_{\hat{p}}$ measures the quantitative importance of the error correction term. The remaining coefficients φ_j^* and β_{ij}^* are related to the short-run dynamics of the model's convergence to equilibrium and are given by:

$$\begin{aligned}\hat{\varphi}_1^* &= \varphi_{\hat{p}} + \varphi_{\hat{p}-1} + \ldots + \varphi_3 + \varphi_2 \\ \hat{\varphi}_2^* &= \varphi_{\hat{p}} + \varphi_{\hat{p}-1} + \ldots + \varphi_3 \\ &\vdots \quad \vdots \quad \vdots \\ \hat{\varphi}_{\hat{p}-1}^* &= \varphi_{\hat{p}}\end{aligned} \tag{13}$$

and

$$\begin{aligned}\beta_{i1}^* &= \beta_{i,\hat{q}_i} + \beta_{i,\hat{q}_i-1} + \ldots + \beta_{i,3} + \beta_{i,2} \\ \beta_{i2}^* &= \beta_{i,\hat{q}_i} + \beta_{i,\hat{q}_i-1} + \ldots + \beta_{i,3} \\ &\vdots \quad \vdots \quad \vdots \\ \beta_{i,\hat{q}_i-1}^* &= \beta_{i,\hat{q}_i}\end{aligned}$$

The estimated standard errors of these estimates allow for non-zero covariances between the estimates of the short-run and long-run coefficients.

Therefore, the error correction representation of the ARDL (1, 2, 3, 1) model is presented in Table 9.

It is evident that a change in the first lag of retail prices ($DLPRICE_1$) has a statistically positive effect on the change in nominal retail trade (*DLTRADE*). Considering the available theories of consumption (Babić, 1998), it is possible (in the short-run) that an increase in retail prices has a positive effect on the retail spending, i.e. retail trade as long as consumers do not realise that retail prices are increased enough in relation to their disposable income. This conclusion is altered in the long-run, which is confirmed by the previous long-run analysis. Namely, the rise in prices reduces real disposable income and thus consumption. Onwards, a change in the net wages (*DLWAGE*) has a positive but statistically insignificant effect on the change in nominal retail trade (*DLTRADE*). However, changes in lags of net wages ($DLWAGE_1$ and $DLWAGE_2$) have a statistically significant and negative effect on the change in nominal retail trade (*DLTRADE*) indicating a negative relationship between net wages and nominal retail trade in the short-run. This can be explained by taking into account the alternative investment possibilities such as savings, investments in the capital market, and so on, that are available to households for allocation of their disposable income (Božina, 2012) which could significantly affect retail spending, i.e. retail trade. Finally, the change in

Table 9. Error correction representation of the ARDL (1, 2, 3, 1) retail trade equation.

	Coefficient	Std. Error	t-ratio	*p-value*
DConst	1.7458	0.49957	3.4945	0.001***
DLPRICE	0.22941	0.41948	0.54690	0.587
$DLPRICE_1$	1.5775	0.46810	3.3700	0.001***
DLWAGE	0.12455	0.39853	0.31251	0.756*
$DLWAGE_1$	−0.70765	0.34397	−2.0573	0.044**
$DLWAGE_2$	−0.88583	0.35266	−2.5118	0.015**
DINT	−4.4558	0.90703	−4.9125	0.000***
ECM_1	−0.11862	0.051709	−2.2941	0.026**

Source: Author's calculation. Note: *D* indicates first difference, while *L* indicates logarithm of the variable.
(***) indicates statistical significance at the 1% level
(**) indicates significance between 1% and 5%
(*) indicates significance between the 5% and 10% levels.

short-term interest rate (*DINT*) has a statistically significant and negative effect on the change in nominal retail trade (*DLTRADE*).

The ECM is found to be negative (i.e. has the correct negative sign) and significant indicating a moderate adjustment to the long-run equilibrium. Nearly 12% of the disequilibria of the previous quarter's shock adjust back to the long-run equilibrium in the current quarter.

It is necessary to mention that our analysis has limitations namely because it does not take into account all (or other) variables that affect retail trade such as unemployment rate, population, available income, outstanding loans, exchange rate, etc.

The conducted empirical analysis confirmed the theoretical assumptions and it is evident that the obtained results support other work in this area as previously discussed in the literature review.

According to the results of empirical analysis, fiscal policy in Croatia could stimulate retail trade in the long-run by reducing the tax burden on wages, which will increase net wages and the purchasing power. On the other hand, reducing the tax rate on products in retail trade could lower retail prices, which can lead to an increase in retail trade. But due to the specific nature of the Croatian economy, primarily due to the high budget deficit, this may not be the optimal decision during recessions.

Empirical analysis confirmed the relationship between interest rate and retail trade in Croatia. Therefore, by lowering the interest rate, Croatian monetary authorities could stimulate retail trade, although this measure is rather limited because of the necessity of preserving exchange rate and price stability. Hence, the determination of the interest rate in Croatia primarily depends on conditions in the banking sector and on capital inflows. It should be noted that fiscal policy can also affect domestic interest rates. For example, tax on bank assets or higher taxes on banking profit can increase the level of interest rates and vice versa.

And finally, at the company level, effective company management can reduce costs and thus retail prices, which could increase retail trade.

4. Conclusion

Retail trade is one of the most significant part of any economy, and is particularly important in small, open and import-dependent economies such as the Croatian economy. The volume of retail trade depends on factors at macro and micro levels of the economy, such as monetary and fiscal policy or company management. For example, monetary policy can affect commercial banks' interest rates. A lower interest rate will boost consumption, which will in turn increase retail trade. On the other hand, higher demand for products and services may increase prices (i.e. retail prices), which will then reduce retail trade. Monetary policy can also affect retail trade by managing the exchange rate. Assuming that there is a correlation between the import prices and the domestic prices (exchange rate pass-through), appreciation of the exchange rate will reduce import prices and thus domestic prices, including retail prices. However, it is necessary to bear in mind that interest rates and exchange rates are related. This issue is particularly important in small, open, highly euroised and import-dependent countries such as Croatia. For example, lower domestic interest rates imply depreciation (due to an increase or excess quantity of domestic currency in circulation) which raises import prices and consequently retail prices. Because of these limitations, large numbers of small and open countries opt for exchange rate stability assuming that interest rates are determined beyond the control of monetary authorities (e.g. domestic interest rates may

be affected by capital inflows or competition in the banking sector). Fiscal policy mainly affects retail trade by changing tax rates, import duties, determining wages, pensions and other benefits in the public sector through negotiations with the labour unions and facilitation of enterprise-level wage negotiations, etc. Hence, higher taxes (e.g. income tax and VAT) reduce net wages and the purchasing power of the private sector and increase prices of goods and services, which in turn decrease retail trade. In addition, the reduction in wages, pensions and other benefits in the public sector will have the same consequences. Of course, all of the above can increase unemployment, which also negatively affects retail trade. Concerning import duties, it must be stressed that Croatian membership in the European Union decreased their significance.

Therefore, it is obvious that the efforts to stimulate retail trade by Croatian monetary authorities and the Croatian government are quite limited. The effects of CNB monetary policy regarding domestic interest rates are limited because of the necessity of preserving exchange rate and price stability and because of the necessity to reduce high budget deficit and achieve budget savings. In order to mitigate the negative impact of the economic and financial crisis on the Croatian economy, the Croatian government is forced to implement restrictive fiscal policy. But we must have in mind that when monetary policy is very limited then economic policy management depends dominantly upon fiscal policy, as is the case in a large number of small and open countries.

Finally, at the company level, retail can be more competitive if management and workers are more educated, more effective in planning and executing tasks, if they implement new technologies, and so on.

As stated before, this paper analyses the effects of changes in retail prices, net wages and short-term interest rate on nominal retail trade in Croatia using the bounds testing (ARDL) approach to cointegration. The results indicate the existence of a stable cointegration relationship between the variables.

In the long-run, an increase in retail prices and short-term interest rates leads to a decrease in nominal retail trade, while an increase in net wages leads to an increase in nominal retail trade. Obtained results are consistent with theoretical assumptions.

In the short-run, positive changes in retail prices have a positive effect on the changes in nominal retail trade, while changes in net wages and short-term interest rates have negative effects on nominal retail trade. Namely, in the short-run it is possible that an increase in retail prices has a positive effect on the retail spending, i.e. retail trade as long as consumers do not realise that retail prices increased enough in relation to their disposable income. On the other hand, a negative relationship between net wages and nominal retail trade in the short-run can be explained by taking into account the alternative investment possibilities such as savings, investments in the capital market, etc., that are available to households for allocation of their disposable income, and which could significantly affect retail spending, i.e. retail trade.

Since the empirical analysis indicates the existence of mutual links between the variables, it confirms there are scientific grounds for Croatian policy maker's intentions to affect economic trends. This primarily applies to the government that is responsible for budget management, while the effects of monetary policy are, as stated before, rather limited.

In the end, this analysis has limitations because it does not take into account all the variables that affect retail trade, such as unemployment rate, population, available income, outstanding loans, exchange rate etc. However, obtained results can be useful to policy makers in making decisions regarding the reduction in unemployment, increasing consumption and assuring stable and sustainable GDP growth.

Notes

1. Since retail trade has a high proportion in the distributive trade and since the distributive trade has a high proportion in GDP, retail trade is often used as a leading indicator of GDP movements along with industrial production and construction
2. Average share of a Croatian household's final consumption expenditure in GDP from 2000 till 2011 was nearly 60%.
3. According to Croatian Bureau of Statistics (2013), final consumption expenditure of households is calculated on the basis of retail trade data, turnover data for hotels and restaurants and results of Household budget survey from the regular surveys of the CBS.
4. Consumption theories in general assume the existence of a relationship between income and consumption and thus wages and retail trade in particular.
5. Importance of retail trade in the national economy arises from the fact that retail trade is a major employer and the largest component of the service sector (Dibb et al., 1991, p. 334).
6. For example, from 1996 until 2011 the average difference between registered and ILO unemployment rate was 5.5%.
7. But, they also depend on consumer demographics, lifestyles, spending patterns and retailing technologies (Kotler & Armstrong, 2012).
8. Recent analysis by Blanchard and Leigh (2013) suggest that in advanced economies, stronger and planned fiscal consolidation has been associated with a lower growth than expected, with the relation being particularly strong, both statistically and economically, early in the crisis. Research indicates that the forecast errors are possible and that economic policy decisions can sometimes be misleading. This is in line with the thinking of Nobel laureate Paul Krugman who strongly prefers consumption relative to savings as a path out of the crisis (http://topics.nytimes.com/top/opinion/editorialsandoped/oped/columnists/paulkrugman/index.html).
9. Today Croatia is a highly euroized economy.
10. Average net wages are taken as a proxy for available income since the data on available income are not published on a quarterly level. According to CBS, average monthly paid off net earnings comprise the income a person in employment earned for work done during regular working hours as well as annual leave, paid leave, public holidays and day-offs as prescribed by law, sickness leave up to 42 days, absence for continuing professional education, during lay-off and job stop caused against person's will and through of no fault of his or her own, worker's meals and net pay on the basis of compensations, allowances and rewards in sums that are subjects to contributions, taxes and surtaxes.
11. Along with personal income, households finance their consumption expenditures concerning retail trade using consumer loans and credit lines. Therefore, the short-term interest rate on kuna credits not indexed to foreign currency to households is taken as the price of such loans. It represents a total average of short-term interest rate on kuna credits not indexed to foreign currency on credit lines and other credits. According to CNB data, its relative significance is very high (almost 40% in October 2012). Data are calculated as a percentage in total credits disbursed in the reporting month.
12. For the multiple time series analysis *Gretl* econometric software is used (http://gretl.sourceforge.net).
13. Using the Arima X12 method.
14. Namely, the computed bounds test, i.e. *F*-statistics, showed that the results of cointegration are inconclusive when a trend is included. Additionally, the comparison of the information criterions (AIC and SBC) showed that a higher value of the information criterion achieves models that do not include a trend. This is further confirmed by the insignificant error correction term (ECM) in models that include a trend. Whether the trend is included or not, AIC selects the ARDL (1, 2, 3, 3) model, while SBC selects the ARDL (1, 2, 3, 1) model. For more, see further analysis.
15. Also, the model using the AIC criterion was estimated but the results were very similar, including the estimated standard errors. Furthermore, the SBC criterion is more suitable for this kind of analysis due to a relatively short estimation period and because it penalises models with a larger number of independent variables more than does the AIC criterion. In other word the SBC criterion is used as it is the more restrictive one.

References

Anić, I. D. (2002). Razvitak hrvatske maloprodaje i ekonomsko okruženje [Retail trade and the economic environment]. *Ekonomski pregled, 53*, 883–902.

Anić, I. D., & Nušinović, M. (2003). Structural changes in the retailing sector – development repositioning, consequences and expectations – the case of Croatia. *Ekonomski pregled, 54*, 225–248.

Arnerić, J., Jurun, E., & Kordić, L. (2009). Empirical study of real retail trade turnover. *World Academy of Science, Engineering and Technology, 49*, 637–641.

Babić, M. (1998). *Makroekonomija* [Macroeconomics]. Zagreb: Mate d.o.o.

Barker, J., Bryant, S., Glass, M., Wehmeyer, J., & Domazlicky, B. R. (2001). Determinants of retail trade in Southeast Missouri, 1990-98. *The Journal of Economics, 27*, 51–61.

Belke, A., & Polleit, T. (2004). Dividend yields for forecasting stock market returns: A cointegration analysis based on the ARDL approach (Discussion Paper No. 244). Hohenheim: Institute of Economics, University of Hohenheim.

Belullo, A. (1999). Utjecaj promjene novčane ponude M1 i M2 na realnu ekonomsku aktivnost u Republici Hrvatskoj [Impact of change of money supply M1 and M2 on real economic activity in the Republic of Croatia]. *Ekonomski pregled, 50*, 310–332.

Billmeier, A., & Bomato, L. (2002). *Exchange rate pass-through and monetary policy in Croatia* (IMF Working Paper, WP/02/109: 1-34.)

Blanchard, O., & Leigh, D. (2013). *Growth forecast errors and fiscal multipliers* (IMF Working Paper, WP/13/1.)

Božina, L. (2012). *Monetarna ekonomija* [Monetary Economics]. Pula: Juraj Dobrila University of Pula.

Brčić-Stipčević, V., & Renko, S. (2004). Croatian retail in transition and approaching the European Union. *Zbornik Ekonomskog fakulteta u Zagrebu/Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business, 2*, 97–108.

Calvo, G. A., & Reinhart, C. M. (2002). Fear of floating. *Quarterly Journal of Economics, 117*, 379–408.

Chopin, M. C., & Darrat, A. F. (2000). Can consumer attitude forecast tile macroeconomy? *American Economist, 44*, 34–43.

Croatian Bureau of Statistics. (2003). Statistical Yearbook of the Republic of Croatia, 2003, 371.

Croatian Bureau of Statistics. (2006). Statistical Yearbook of the Republic of Croatia, 2006, 185–398.

Croatian Bureau of Statistics. (2007). Statistical Yearbook of the Republic of Croatia, 2007, 196.

Croatian Bureau of Statistics. (2009). Statistical Yearbook of the Republic of Croatia, 2009, 385.

Croatian Bureau of Statistics. (2010). Statistical Yearbook of the Republic of Croatia, 2010, 198–199.

Croatian Bureau of Statistics. (2013). Statistical Yearbook of the Republic of Croatia, 2013, 201.

Croatian Chamber of Economy. (2012). Distributivna trgovina [Distributive trade]. [Adobe Digital Editions version]. Retrieved from http://www.hgk.hr/wp-content/files_mf/Distributivna_trgovina%202011.pdf

Cziráky, D. (2002). Cointegration analysis of the monthly time-series relationship between retail sales and average wages in Croatia. *Croatian International Relations Review, 8*, 129–138.

Dibb, S., Simkin, L., Pride, W. M., & Ferrell, O. C. (1991). *Marketing*. Zagreb: Mate d.o.o.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*, 427–431.

Dore, M. H. I., & Singh, R. G. (2009). Turning points in nonlinear business cycle theories, financial crisis and the global 2007–2008 downturn. *Nonlinear Dynamics, Psychology and Life Sciences, 13*, 423–444.

Dore, M. H. I., & Singh, R. G. (2010). The role of credit in the 2007–09 great recession. The 8th OxMetrics User Conference, The George Washington University, Washington, DC, March 18–19, 2010.

Foster, L., Haltiwanger, J., & Krizan, C. J. (2006). Market selection, reallocation and restructuring in the U.S. retail trade sector in the 1990s. *Review of Economics and Statistics, 88*, 748–758.

GFK. (2000). 1st conference on Croatian consumer. Materials from the conference held in Zagreb in 2000.

Jantzen, R., Pescatrice, D., & Braunstein, A. (2009). Wal-mart and the US economy. *Eastern Economic Journal, 35*, 297–308.

Kotler, P., & Armstrong, G. (2012). *Principles of marketing* (14th ed.). New Jersey: Pearson Prentice Hall.

Kotler, P., Armstrong, G., Saunders, J., & Wong, W. (1999). *Principles of marketing – Second European Edition*. Harlow: Prentice Hall Europe.

Kwiatkowski, D., Phillips, P., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *Journal of Econometrics, 54*, 159–178.

MacKinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics, 11*, 601–618.

Netessine, S., Fisher, M. L., & Krishnan, J. (2010). Labor planning, execution, and retail store performance: an exploratory investigation (Working Paper Series), 1–40. Social Science Research Network. Retrieved from http://ssrn.com/abstract=2319863

Pesaran, M. H., & Shin, Y. (1999) An autoregressive distributed lag modelling approach to cointegration analysis. In S. Strom (Ed.), *Econometrics and economic theory in 20th century: The Ragnar Frisch centennial symposium* (pp. 371–413). Cambridge: Cambridge University Press.

Pesaran, M. H., Shin, Y., & Smith, R. J. (1996). *Testing for the existence of a long run relationship* (DAE working paper, 9622).

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika, 75*, 335–346.

Pufnik, A., & Kunovac, D. (2012) Način na koji poduzeća u Hrvatskoj određuju i mijenjaju cijene svojih proizvoda: Rezultati ankete poduzeća i usporedba s eurozonom [The way in which Croatian companies determine and change the prices of their products: Results of a survey of companies and comparison with the Eurozone] (Working Papers No. 39). Zagreb: Croatian National Bank.

Rose, P. S. (2005). Commercial Bank Management. Zagreb: Mate d.o.o.

Sorić, P., & Marković, M. (2010). Predicting downturn: Are tendency surveys a good estimator of retail activity in Croatia? *Ekonomski pregled, 61*, 559–575.

The Institute of Economics, Zagreb (2012). Mjerodavno tržište i tržišni Udell u trgovini na malo u Hrvatskoj i EU: Studies [The relevant market and market shares in retail trade in Croatia and the EU: Studies] [Adobe Digital Editions version]. Retrieved from http://www.eizg.hr/Download.ashx?FileID=5d4e4467-ef4d-4a45-a7d9-9bfd63134943

Ton, Z., & Huckman, R. S. (2008). Managing the impact of employee turnover on performance: The role of process conformance. *Organization Science, 19*, 56–68.

Ton, Z., & Raman, A. (2004). The effect of product variety and inventory levels on misplaced products at retail stores: A longitudinal study (Working Paper). Boston: Harvard Business School.

Topić, M. (2006). Siva ekonomija u Hrvatskoj [The grey economy in Croatia]. *Hrvatska revija, 6*, 100–103.