UNIVERSITÄT PASSAU

Wirtschaftswissenschaftliche Fakultät

Revisiting habits and heterogeneity in demands

Markus Fritsch, Andrew Adrian Yu Pua, Joachim Schnurbus

Diskussionsbeitrag Nr. V-78-19

Volkswirtschaftliche Reihe ISSN 1435-3520

PASSAUER DISKUSSIONSPAPIERE

Herausgeber:
Die Gruppe der volkswirtschaftlichen Professoren
der Wirtschaftswissenschaftlichen Fakultät
der Universität Passau
94030 Passau

Revisiting habits and heterogeneity in demands

Markus Fritsch, Andrew Adrian Yu Pua, Joachim Schnurbus

Diskussionsbeitrag Nr. V-78-19

Volkswirtschaftliche Reihe ISSN 1435-3520

Adresse des Autors/der Autoren:

Markus Fritsch
Wirtschaftswissenschaftliche Fakultät
Universität Passau
94030 Passau

Telefon: +49 851 509 2565
Telefax: +49 851 509 2562
E-Mail: markus.fritsch@uni-passau.de

Revisiting habits and heterogeneity in demands*

Markus Fritsch[†], Andrew Adrian Yu Pua[‡], Joachim Schnurbus[§]

September 22, 2019

Abstract

We conduct a narrow replication of Browning and Collado (*Journal of Applied Econometrics* 2007; **22**(3): 625–640). They estimate a linear panel AR(1) version of an Engel curve for six consumption composites using iterated GMM. We find that the coefficient estimates and standard errors differ from the reported results when we use their instrument set; in particular, we find habit formation in non-durable services and no state dependence in small durables. Despite finding evidence for weak instruments, our results support most of the claims made in the original paper and are also unable to detect intertemporal dependence strong enough to resolve existing macro puzzles.

Keywords. Habit formation, linear dynamic panel data methods, weak instruments.

JEL codes. C23, C26, D12.

*We thank Harry Haupt, Rolf Tschernig, and the participants of the First Workshop on Statistics and Econometrics in Passau, 2017, for helpful comments and discussions. Support from the Fundamental Research Funds for the Central Universities (Grant No. ZK1040) is greatly appreciated. All errors are ours.

[†]University of Passau, Germany, Markus.Fritsch@uni-passau.de

[‡]The Wang Yanan Institute for Studies in Economics and the Department of Statistics at the School of Economics, Xiamen University, andrewypua@gmail.com

[§]University of Passau, Germany, Joachim.Schnurbus@uni-passau.de

1 Introduction

Browning and Collado (2007), henceforth BC, construct budget shares from six consumption composites, namely, food inside the home (`foodin`), non-durable services (`nds`), food outside the home (`foodout`), alcohol and tobacco (`alct`), clothing (`clo`), and small durables (`sdur`) based on data from the Spanish Family Expenditure Survey (ECPF). BC use the data to estimate a quadratic almost ideal demand system (QAIDS; see Banks, Blundell, and Lewbel, 1997) version of an Engel curve. They deduce that the squared term in a QAIDS specification may introduce 'spurious explanatory power that ignores temporal dependencies' (see p.632) based on the empirical evidence of their Tables I to IV (which we are able to replicate). Consequently, they estimate a linear AR(1) panel data version of an Engel curve (results reported in their Tables V and VI). They use Holtz-Eakin, Newey, and Rosen (1988)-type and Arellano and Bover (1995)-type linear moment conditions, where the latter arise from a constant correlated effects assumption to identify habit persistence. Identifying habit persistence allows them (1) to classify these composites into habit-forming, durable, or neither, (2) to estimate short-run and long-run income elasticities, and (3) to provide a micro-founded estimate of the habit formation parameter used in calibrating real business cycle models.

In this paper, we revisit their application of linear dynamic panel data methods reported in their Tables V and VI. Pesaran (2015, p.686-688) uses this application as an example in his recent econometrics textbook discussing panel data econometrics. Precisely following the description in BC, we encounter missing details and obtain some differences regarding the results and the respective interpretations. All computations in this replication are carried out using `Stata 12` (StataCorp, 2011).[1] Since Tables I to IV of BC motivate the dynamic panel data methods employed in their paper, we discuss the narrow replication of these results in our introduction:

- Table I in BC, which contains the descriptive statistics of budget shares, is perfectly reproducible. We do not report the replicated results here.

- Table II of BC, which contains the estimates of the QAIDS specification of the Engel curves, is not perfectly reproducible. All entries for `foodout` and `alct` as well as all test results and elasticities are almost perfectly reproducible. For all other composites, the standard errors are very close to the reported ones, and most of the coefficients are close to the reported ones. The qualitative results remain unchanged. The results based on two-stage least-squares estimation carried out with the `Stata` command `ivregress` are presented in Table 3 of the Appendix.

- Table III of BC, which contains estimated autocorrelations of residuals based on the Engel curve estimates in Table II of BC, is not perfectly reproducible, but our replication results are very close to the reported ones. The remaining statistics are the Arellano and Bond (1991) test statistics for first and second order autocorrelation in the error terms. Although the results are not perfectly reproducible, the substantive conclusions are unchanged. The detailed results are reported in Table 4 of the Appendix.

- Table IV of BC contains two-step GMM estimates of an Engel curve. Apart from the intercepts, the non-dummy coefficient estimates and standard errors can be reproduced exactly with the `Stata` command `ivreg2`; using the command `ivregress` produces slightly different standard errors. Concerning the elasticities, the qualitative results remain unchanged when

[1] More specifically, we use the built-in functions `ivregress`, `ivreg2`, and `gmm`, along with the function `xtdpdgmm` contributed by Kripfganz (2018).

using either command – although minor differences compared to BC occur. We present our estimation results obtained with the function `ivregress` and the corresponding elasticities in Table 5 of the Appendix. Note that the instrument set actually employed in BC differs from their description (see p.632) and is given below Table IV.

2 GMM estimation of Engel curves

BC estimate augmented Engel curves allowing for household-specific unobserved heterogeneity and first-order dynamics, while excluding the quadratic term from the QAIDS specification. In particular, they model budget shares $\omega_{i,h,t}$ as follows:

$$\omega_{i,h,t} = \alpha_i + \beta_i \texttt{lrxtot}_{h,t} + \gamma_i \omega_{i,h,t-1} + \sum_k \delta_{i,k} z_{k,h,t} + u_{i,h,t}, \tag{1}$$

$$u_{i,h,t} = \rho_{i,h} + \varepsilon_{i,h,t}, \tag{2}$$

where i indexes the six composite commodities, h indexes households, t indexes time, $\texttt{lrxtot}_{h,t}$ is the logarithm of real total expenditures, α_i denotes a good-specific intercept, $z_{k,h,t}$ are a set of controls, $\rho_{i,h}$ is an unobserved household-specific effect, and $\varepsilon_{i,h,t}$ is an unobservable idiosyncratic error term. The controls include the number of children (`nch`) and adults (`nah`) in the household, the age and squared age of the husband (`hage` and `hage2`), year-quarter dummies (up to a maximum of 48 for the four quarters of the 12 years investigated), and weekly seasonal dummies.

The presence of unobserved household-specific effects along with lagged budget shares $\omega_{i,h,t-1}$ requires considering the usual assumptions of linear dynamic panel data methods in order to consistently estimate the coefficients of Equation (1). Instead of using past values of the lagged budget share as instruments (which is usually done in estimation of linear dynamic panel data models; see, e.g., Holtz-Eakin, Newey, and Rosen, 1988 and Arellano and Bover, 1995), BC use lags and lagged first differences of $\texttt{lrxtot}_{h,t}$ and of the logarithm of real husband income $\texttt{lrhearn}_{h,t}$ as instruments to identify the parameters of the model, in particular, the habit persistence parameter γ_i. These instruments arise from the following orthogonality conditions for the equation in first differences and the equation in levels:

$$\mathbb{E}\left(\Delta\varepsilon_{i,h,t}\,\texttt{lrxtot}_{h,t-k}\right) = 0, \quad \forall k = 2, \ldots, K_x \tag{3}$$

$$\mathbb{E}\left(\Delta\varepsilon_{i,h,t}\,\texttt{lrhearn}_{h,t-k}\right) = 0, \quad \forall k = 0, \ldots, K_y \tag{4}$$

$$\mathbb{E}\left(u_{i,h,t}\,\Delta\texttt{lrxtot}_{h,t-k}\right) = 0, \quad \forall k = 1, \ldots, K_{\Delta x} \tag{5}$$

$$\mathbb{E}\left(u_{i,h,t}\,\Delta\texttt{lrhearn}_{h,t-k}\right) = 0, \quad \forall k = 0, \ldots, K_{\Delta y}. \tag{6}$$

On p.634 and the notes to Table V, BC report that they use $K_x = K_y = 5$ and $K_{\Delta x} = K_{\Delta y} = 4$. Employing this instrument set, we are unable to reproduce the reported 81 degrees of freedom for the J-statistic. We therefore set $K_{\Delta x} = K_{\Delta y} = 5$ to obtain the reported number of overidentifying restrictions. As a robustness check, BC impose the orthogonality conditions stated in Equations (4) and (6), with $K_y = 5$ and $K_{\Delta y} = 4$, while we set $K_{\Delta y} = 5$ to be consistent with our preceding choice. We are unable to obtain the 73 degrees of freedom reported by BC for the J-statistic for either choice of $K_{\Delta y}$. BC use iterated GMM to obtain their results. We report our replication of their Tables V and VI in the corresponding Tables 1 and 2.

We use the built-in `Stata` command `gmm` to estimate the Engel curves under the orthogonality conditions discussed above. This built-in function has the advantage of allowing for iterated GMM whereas other built-in `Stata` commands and user-contributed functions only allow for two-step

GMM. Unfortunately, both the interactive and moment-evaluator versions of the command are susceptible to programming errors and breakdowns due to perfect collinearity of instruments, especially when there are a large number of time and seasonal dummies. We suggest that practitioners use the extension of the Frisch-Waugh-Lovell Theorem provided by Giles (1984) and first orthogonalize the dependent variable and the regressors with respect to the dummies (also denoted as partialling out) before GMM estimation. Note that there is no need to orthogonalize the instruments with respect to the dummies. This first step facilitates estimation with the `gmm` command, does not affect the number of overidentifying restrictions, and results in estimation output that focuses on the key variables of interest. Finally, partialling out the dummies speeds up the `gmm` command considerably.

3 Replication in a narrow sense

Contrasting our estimation results with BC reveals that, while most of the standard errors are roughly similar, some of the coefficient estimates for the natural logarithm of real total expenditures (`lrxtot`) and the lagged budget shares differ considerably. An example for a pronounced change is the result for `foodout` in Table 2, where our habit persistence parameter estimate is near one. However, most of the coefficient estimates and standard errors for the non-dummy control variables do not change very much. Commodities are classified based on the statistical significance and the sign of the coefficient estimate of the lagged budget share (`lbs`) at a significance level of $\alpha = 5\%$. Habit formation is attributed to a statistically significant coefficient which is positive, and durability to a statistically significant coefficient which is negative; otherwise, commodities are considered to exhibit no state dependence. In particular, BC report that `nds` are not state dependent and that `sdur` exhibit durability. Our results suggest that `nds` are habit-forming, while `sdur` have no state dependence.

Similar to BC, we also report overidentifiying restriction tests and tests for underidentification. For testing overidentifying restrictions, we proceed as BC and calculate the J-statistics of Sargan (1958) and Hansen (1982). We find that the null is not rejected even at the 10% level for the six consumption composites, while BC report rejections of the null for the J-test at the 5% significance level for `foodin` ($p = 0.0495$) and `clo` ($p = 0.0418$) in their Table V.

In contrast to BC, we use the underidentification test proposed by Windmeijer (2017) instead of the Arellano, Hansen, and Sentana (2012) test because all the moment conditions employed are linear. Windmeijer (2017) shows that an easily implementable version of the test by Arellano, Hansen, and Sentana (2012) involves computing the J-statistic from the same `Stata` command used to calculate GMM estimates but with the lagged dependent variable not used as a covariate, but as the dependent variable.[2] A rejection of the test of overidentifying restrictions indicates that the chosen instruments may not be weak. BC do not report any weak instrument problem in their Table V and do not elaborate on the indication of weak instruments for `foodout` ($p = 0.1662$) in their Table VI. The diagnostics employed in our replication suggest that the instruments employed are considerably weak, especially for `nds` and `foodout` in Table 1 and `nds`, `foodout`, `alct`, and `clo` in Table 2.

We report the 25th, 50th, and 75th percentiles of the calculated point estimates of short-run and long-run expenditure elasticities. Most of the descriptive statistics and relative magnitudes for the calculated income elasticities are similar to the results reported by BC, with the exception of `foodout` in Table 2 where the long-run income elasticities exhibit the most pronounced changes. BC report values from 1.09 to 1.30, while we obtain values from 8.68 to 27.15. In total, despite some of

[2] At this point, we use `xtdpdgmm` for the calculation since two-step GMM estimation should be adequate.

the changes in the results being substantial, they were not large enough to change the classification of the composites from luxuries to necessities and vice versa.

Finally, BC calculate point estimates of the relative loss from habits $\chi_{h,t}$ defined as

$$\chi_{h,t} = \sum_i \gamma_i \omega_{i,h,t}.$$

Their definition for the relative loss from habits assumes a constant total expenditure path. BC obtain 0.01, 0.076, and 0.14 for the 1st, 5th, and 9th deciles of the relative loss from habits. We obtain 0.047, 0.122, and 0.198, if we use the estimates from Table 1. Equivalently, we obtain 0.018, 0.147, and 0.296, if we use estimates from Table 2. Our results are larger than what BC report but not large enough to reach a value of 0.73. This value is required for habits (arising from the preferences of consumers) to reconcile asset return data with a standard real business cycle equilibrium model (Boldrin, Christiano, and Fisher, 2001). This large discrepancy in the required amount of habit formation, which contributes to existing macro puzzles, has been extensively documented and explained in a recent meta-analysis of habit formation studies by Havranek, Rusnak, and Sokolova (2017). Even if we compute the time series average of $\chi_{h,t}$, the estimated values are in between 0.004 to 0.249 and -0.069 to 0.465, for Tables 1 and 2, respectively. The only way to reach a value of 0.73 for $\chi_{h,t}$ is to consider the estimates in Table 2 and focus on estimates of the relative loss from habits above the 99th percentile.

4 Concluding remarks

We are able to replicate Tables I to IV of BC, while we are not able to fully replicate their results for Tables V and VI. Reporting results of GMM estimation of dynamic panel data models can be daunting, given that we have to explicitly state the orthogonality conditions in order to enable straightforward replication. The presence of time and seasonal dummies along with unbalanced panel data may complicate the counting and inclusion of instruments for the level and differenced equations in `Stata` and other statistical software. We suggest using the extension of the Frisch-Waugh-Lovell Theorem to facilitate the inclusion of such dummies in practice. BC identify the habit persistence parameters by imposing a constant correlated effects assumption. As in BC, our results suggest that there is no evidence to reject this assumption. However, the weak instrument problem has yet to be addressed.

References

Arellano, M, LP Hansen, and E Sentana (2012). "Underidentification?" In: *Journal of Econometrics* 170.2, pp. 256–280.

Arellano, M and S Bond (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations". In: *The Review of Economic Studies* 58.2, pp. 277–297.

Arellano, M and O Bover (1995). "Another look at the instrumental variable estimation of error-components models". In: *Journal of Econometrics* 68.1, pp. 29–51.

Banks, J, R Blundell, and A Lewbel (1997). "Quadratic Engel Curves and Consumer Demand". In: *The review of economics and statistics* 79.4, pp. 527–539.

Boldrin, M, LJ Christiano, and JD Fisher (2001). "Habit Persistence, Asset Returns, and the Business Cycle". In: *American Economic Review* 91.1, pp. 149–166.

Browning, M and MD Collado (2007). "Habits and heterogeneity in demands: a panel data analysis". In: *Journal of Applied Econometrics* 22.3, pp. 625–640.

Giles, DE (1984). "Instrumental variables regressions involving seasonal data". In: *Economics Letters* 14.4, pp. 339–343.

Hansen, LP (1982). "Large Sample Properties of Generalized Method of Moments Estimators". In: *Econometrica* 50.4, pp. 1029–1054.

Havranek, T, M Rusnak, and A Sokolova (2017). "Habit formation in consumption: A meta-analysis". In: *European Economic Review* 95, pp. 142–167.

Holtz-Eakin, D, K Newey Whitney, and HS Rosen (1988). "Estimating Vector Autoregressions with Panel Data". In: *Econometrica* 56.6, pp. 1371–1395.

Kripfganz, S (2018). *XTDPDGMM: Stata module to perform generalized method of moments estimation of linear dynamic panel data models*. Version 1.1.1. URL: `http://EconPapers.repec.org/RePEc:boc:bocode:s458395`.

Pesaran, MH (2015). *Time Series and Panel Data Econometrics*. Oxford University Press.

Sargan, JD (1958). "The Estimation of Economic Relationships Using Instrumental Variables". In: *Econometrica* 26.3, pp. 393–415.

Stata Corporation (2011). *Stata Statistical Software: Release 12*. StataCorp LP. College Station, TX.

Windmeijer, F (2017). *A simple underidentification test for linear IV models, with an application to dynamic panel data models*. Working Paper.

Table 1: Replication of Table V of BC – Iterated GMM

	foodin	nds	foodout	alct	clo	sdur
lrxtot	-9.8360^{***}	-3.3543^{*}	3.3088^{**}	-0.5093	5.3193^{**}	4.4096^{***}
	(1.9275)	(1.6736)	(1.1231)	(0.4244)	(1.5575)	(0.9329)
lbs	0.0038	0.2964^{***}	0.4211^{***}	0.1280^{*}	-0.1772^{***}	-0.0379
	(0.0307)	(0.0821)	(0.0938)	(0.0571)	(0.0427)	(0.0512)
nch	1.9428^{***}	-0.3271	-0.4704^{***}	0.0413	-0.2927	-0.3974^{***}
	(0.2109)	(0.1765)	(0.1189)	(0.0561)	(0.1518)	(0.1014)
nad	0.3413	0.3820	0.2678	0.2530^{**}	-0.9684^{***}	-0.8719^{***}
	(0.3195)	(0.2879)	(0.1832)	(0.0850)	(0.2683)	(0.1588)
hage	0.4817^{*}	0.7562^{***}	-0.2780^{*}	-0.3161^{***}	-0.1318	-0.5417^{***}
	(0.2126)	(0.1847)	(0.1172)	(0.0635)	(0.1597)	(0.1013)
hage2	-0.0030	-0.0083^{***}	0.0025^{*}	0.0031^{***}	0.0011	0.0054^{***}
	(0.0023)	(0.0021)	(0.0012)	(0.0007)	(0.0017)	(0.0011)
Iterations	8	14	23	8	10	12
J-statistic	75.20	56.10	80.91	61.85	95.99	90.83
p-value (81 df)	0.6607	0.9842	0.4818	0.9440	0.1223	0.2134
Underident. test	399.22	95.41	85.99	175.74	282.42	199.19
p-value (82 df)	< 0.001	0.1478	0.3599	< 0.001	< 0.001	< 0.001
Short-run elasticities						
Q25	0.62	0.85	1.21	0.68	1.28	1.54
Median	0.72	0.89	1.36	0.84	1.46	2.22
Q75	0.78	0.92	1.71	0.91	1.88	4.19
Long-run elasticities						
Q25	0.62	0.79	1.36	0.63	1.24	1.52
Median	0.72	0.85	1.63	0.81	1.39	2.18
Q75	0.78	0.88	2.23	0.89	1.75	3.96

Equations in first differences: $L\,(2/5)\,.lrxtot, L\,(0/5)\,.lrhearn, D.nch, D.nad, D.hage, D.hage2$
Equations in levels: $L\,(0/5)\,.D.lrxtot, L\,(0/5)\,.D.lrhearn, nch, nad, hage, hage2$
Clustered standard errors in parentheses; household ID used as clustering variable
$nT = 15739$ for equations in levels; $nT = 13290$ for equations in differences; number of households = 2449
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (refers to t-test of the null that the coefficient is equal to zero)

Table 2: Replication of Table VI of BC – Robustness check

	foodin	nds	foodout	alct	clo	sdur
lrxtot	−12.0763***	−0.6388	2.7530	−0.9904	2.8548	4.0778*
	(2.7173)	(2.8456)	(1.8120)	(0.5763)	(2.4964)	(1.6222)
lbs	0.0128	0.2724*	0.9773***	0.4573***	−0.3995**	−0.1542
	(0.0946)	(0.1258)	(0.1008)	(0.0937)	(0.1156)	(0.0930)
nch	1.9685***	−0.4735*	−0.0834	0.0597	−0.2083	−0.3821**
	(0.2575)	(0.2098)	(0.1143)	(0.0438)	(0.1934)	(0.1208)
nad	0.6287	−0.0065	−0.3487	0.2819**	−0.6764	−0.8569***
	(0.4088)	(0.4332)	(0.2697)	(0.0941)	(0.3957)	(0.2393)
hage	0.6850**	0.6230*	−0.1700	−0.1625*	0.0813	−0.5524***
	(0.2523)	(0.2512)	(0.1347)	(0.0682)	(0.2212)	(0.1379)
hage2	−0.0052	−0.0069*	0.0018	0.0016*	−0.0012	0.0055***
	(0.0027)	(0.0027)	(0.0014)	(0.0007)	(0.0024)	(0.0015)
Iterations	10	14	13	23	26	19
J-statistic	41.31	30.10	34.81	41.20	48.44	61.25
p-value (49 df)	0.7745	0.9847	0.9372	0.7782	0.4959	0.1125
Underident. test	79.89	50.54	58.16	51.14	62.83	79.74
p-value (50 df)	0.0046	0.4519	0.2001	0.4288	0.1051	0.0047
Short-run elasticities						
Q25	0.53	0.97	1.17	0.38	1.15	1.50
Median	0.65	0.98	1.30	0.68	1.25	2.13
Q75	0.73	0.98	1.59	0.82	1.47	3.95
Long-run elasticities						
Q25	0.52	0.96	8.68	−0.15	1.11	1.44
Median	0.65	0.97	14.31	0.42	1.18	1.98
Q75	0.72	0.98	27.15	0.66	1.34	3.56

Equations in first differences: $L\,(0/5)\,.lrhearn, D.nch, D.nad, D.hage, D.hage2$

Equations in levels: $L\,(0/5)\,.D.lrhearn, nch, nad, hage, hage2$

Clustered standard errors in parentheses; household ID used as clustering variable

$nT = 15739$ for equations in levels; $nT = 13290$ for equations in differences; number of households = 2449

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (refers to t-test of the null that the coefficient is equal to zero)

5 Appendix

Table 3: Replication of Table II of BC – QAIDS Engel curve estimates

	foodin	nds	foodout	alct	clo	sdur
lrxtot	−44.77	−53.38	84.30*	−65.55**	48.19	31.22
	(54.85)	(59.51)	(39.65)	(25.29)	(40.44)	(31.33)
lrxtot2	1.019	2.534	−3.174*	2.421*	−1.728	−1.073
	(2.085)	(2.264)	(1.508)	(0.960)	(1.540)	(1.192)
nch	2.378***	−1.263***	−0.657***	0.101	−0.192	−0.367***
	(0.200)	(0.201)	(0.134)	(0.0695)	(0.119)	(0.0912)
nad	1.546***	−1.946***	1.161***	0.534***	−0.633***	−0.662***
	(0.225)	(0.252)	(0.177)	(0.0862)	(0.144)	(0.0979)
hage	1.157***	−0.117	−0.304	−0.221**	−0.0512	−0.463***
	(0.192)	(0.224)	(0.158)	(0.0789)	(0.128)	(0.0894)
hage2	−0.0102***	0.000784	0.00252	0.00202*	0.000388	0.00451***
	(0.00214)	(0.00251)	(0.00177)	(0.000857)	(0.00143)	(0.000997)
const	409.3	306.4	−541.5*	450.8**	−320.0	−205.0
	(358.2)	(388.4)	(258.6)	(165.3)	(263.7)	(204.4)
$\chi^2(2)$	556.56	218.79	6.53	47.18	26.92	75.57
p-value	< 0.001	< 0.001	0.0382	< 0.001	< 0.001	< 0.001
Income elasticities						
Q25	0.31	1.30	0.93	−0.32	1.12	1.34
Median	0.48	1.40	1.11	0.42	1.24	1.81
Q75	0.58	1.56	1.42	0.83	1.52	3.19

Note, that $lrxtot$ and $lrxtot2$ are instrumented by $lrhearn$ and $lrhearn2$
Clustered standard errors in parentheses; household ID used as clustering variable
$n = 18188$, number of groups = 2449
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (refers to t-test of the null that the coefficient is equal to zero)

Table 4: Replication of Table III of BC – Autocorrelations of residuals

	foodin	nds	foodout	alct	clo	sdur
1st-order	0.3751	0.3572	0.4102	0.5908	0.1184	0.1320
2nd-order	0.3526	0.3348	0.3922	0.5755	0.1627	0.1043
3rd-order	0.3430	0.3254	0.3869	0.5551	0.1146	0.0755
4th-order	0.3892	0.3508	0.4012	0.5567	0.1967	0.1532
5th-order	0.3077	0.2806	0.3499	0.5236	0.1044	0.1137
6th-order	0.2582	0.2627	0.3353	0.5005	0.1258	0.0747
7th-order	0.2851	0.2462	0.3469	0.5009	0.1180	0.0704
Test for 1st-order serial corr.	20.321	21.220	19.871	17.439	10.540	9.522
p-value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Test for 2nd-order serial corr.	19.384	19.897	19.229	17.325	13.719	9.002
p-value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 5: Replication of Table IV of BC – Budget shares in levels

	foodin	nds	foodout	alct	clo	sdur
lrxtot	−13.63***	−0.297	0.140	−0.206	3.190***	2.938***
	(1.090)	(0.453)	(0.519)	(0.129)	(0.530)	(0.457)
lbs	0.0008	1.008***	0.9901***	0.5937***	−0.0596	−0.1450
	(0.0587)	(0.0550)	(0.0939)	(0.0785)	(0.0712)	(0.0957)
nch	2.138***	0.0670	0.0631	0.0346	−0.161	−0.553***
	(0.260)	(0.147)	(0.119)	(0.0417)	(0.185)	(0.113)
nad	1.084***	−0.296	0.117	0.181***	−0.653***	−0.520***
	(0.270)	(0.154)	(0.122)	(0.0548)	(0.194)	(0.144)
hage	0.768***	−0.200	0.0475	−0.119*	0.0362	−0.402***
	(0.221)	(0.139)	(0.103)	(0.0525)	(0.164)	(0.121)
hage2	−0.00612*	0.00204	−0.000451	0.00112*	−0.000644	0.00364**
	(0.00241)	(0.00155)	(0.00112)	(0.000554)	(0.00180)	(0.00132)
const	188.2***	6.349	−4.116	6.953**	−28.22***	−20.38***
	(14.72)	(5.631)	(5.060)	(2.532)	(6.595)	(4.840)
J-statistic	53.10	11.26	8.60	62.74	8.60	19.02
p-value	< 0.001	0.2581	0.4746	< 0.001	0.4746	0.0251
Short-run elasticities						
Q25	0.47	0.99	1.01	0.87	1.17	1.36
Median	0.61	0.99	1.02	0.93	1.28	1.82
Q75	0.69	0.99	1.03	0.96	1.53	3.13
Long-run elasticities						
Q25	0.47	1.88	1.89	0.68	1.16	1.32
Median	0.61	2.15	2.54	0.84	1.26	1.71
Q75	0.69	2.58	4.03	0.91	1.50	2.86

With *lrxtot* and lbs instrumented by: $L\,(1/5)\,.lrxtot, L\,(0/5)\,.lrhearn$

Clustered standard errors in parentheses; household ID used as clustering variable

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (refers to t-test of the null that the coefficient is equal to zero)

Volkswirtschaftliche Reihe der Passauer Diskussionspapiere

Bisher sind erschienen:

V-1-98	Gerhard Rübel, Can adjustments to working hours help reduce unemployment?
V-2-98	Martin Werding, Pay-as-you-go Public Pension Schemes and Endogenous Fertility: The Reconstruction of Intergenerational Exchange
V-3-98	Carsten Eckel, International Trade, Direct Investment, and the Skill Differential in General Equilibrium
V-4-98	Reinar Lüdeke, Das Staatsbudget und intergenerationelle Umverteilung, Das Staatsvermögen als Instrument intergenerativer Verteilungspolitik und der "generational accounting"-Ansatz: Alter Wein in neuen (höherwertigen) Schläuchen?
V-5-98	Anja Klüver und Gerhard Rübel, Räumliche Industriekonzentration und die komparativen Vorteile von Ländern - eine empirische Studie der Europäischen Union
V-6-98	Klaus Beckmann und Elisabeth Lackner, Vom Leviathan und von optimalen Steuern
V-7-98	Martin Werding, The Pay-as-you-go Mechanism as Human Capital Funding: The "Mackenroth hypothesis" Revisited
V-8-98	Reinar Lüdeke und Klaus Beckmann, Social Costs of Higher Education: Production and Financing. The Case of Germany (1994)
V-9-98	Gerhard Rübel, "Faire" Löhne und die Flexibilität von Arbeitsmärkten in einem Zwei-Sektoren-Modell
V-10-98	Klaus Beckmann, Notizen zum Steueranteil von Rentenversicherungsbeiträgen im Umlageverfahren
V-11-98	Christian Jasperneite und Hans Joachim Allinger, Trendwende am westdeutschen Arbeitsmarkt? - Eine ökonometrische Analyse
V-12-98	Christian Jasperneite und Hans Joachim Allinger, Langfristige Perspektiven für den westdeutschen Arbeitsmarkt: Was sagen die Gesetze von Okun und Verdoorn?
V-13-98	Hans Joachim Allinger und Christian Jasperneite, Saisonbereinigung von Arbeitsmarktdaten bei aktiver Arbeitsmarktpolitik
V-14-99	Reinar Lüdeke und Klaus Beckmann, Hochschulbildung, Humankapital und Beruf: Auswertung einer Längsschnittsbefragung Passauer Absolventen 1988 - 1998

V-15-99 Gerhard Rübel, Volkseinkommenssteigerung durch ausgabenfinanzierte Steuersenkung - Eine Umkehrung des Haavelmo-Theorems für offene Volkswirtschaften

V-16-99 Silke Klüver, Konzentrationsursachen in der europäichen Versicherungsbranche - eine empirische Untersuchung

V-17-99 Reinar Lüdeke, Familienlastenausgleich, Elternleistungsausgleich und die Neufundierung der umlagefinanzierten Altersversorgung

V-18-99 Anja Klüver und Gerhard Rübel, Industrielle Konzentration als Kriterium für die Geeignetheit eines einheitlichen Währungsraums – Eine empirische Untersuchung der Europäischen Union von 1972 bis 1996

V-19-00 Carsten, Eckel, Fragmentation, Efficiency-seeking FDI, and Employment

V-20-00 Christian Jasperneite, Understanding Hysteresis in Unemployment: The German Case

V-21-00 Jörg Althammer, Reforming Family Taxation

V-22-00 Carsten Eckel, Labor Market Adjustments to Globalization: Unemployment versus Relative Wages

V-23-00 Klaus Beckmann, Tax Competition through Tax Evasion

V-24-01 Klaus Beckmann, Steuerhinterziehung, begrenzte Rationalität und Referenzabhängigkeit: Theorie und experimentelle Evidenz

V-25-01 Klaus Beckmann, Solidarity, Democracy, and Tax Evasion: an Experimental Study

V-26-04 Michael Fritsch, Udo Brixy und Oliver Falck, The Effect of Industry, Region and Time on New Business Survival - A Multi-Dimensional Analysis

V-27-04 Gerhard D. Kleinhenz, Bevölkerung und Wachstum - Die Bevölkerungsentwicklung in Deutschland als Herausforderung für Wirtschafts- und Sozialpolitik

V-28-04 Johann Graf Lambsdorf, The Puzzle with Increasing Money Demand - Evidence from a Cross-Section of Countries

V-29-04 Frauke David, Oliver Falck, Stephan Heblich und Christoph Kneiding, Generationsgerechtigkeit und Unternehmen

V-30-04 Roland Engels†, Zur mikroökonomischen Fundierung der Geldnachfrage in allgemeinen Gleichgewichtsmodellen

V-31-05 Johann Graf Lambsdorff, Between Two Evils – Investors Prefer Grand Corruption!

V-32-05 Oliver Falck, Das Scheitern junger Betriebe – Ein Überlebensdauermodell auf Basis des IAB-Betriebspanels

V-33-05 Raphaela Seubert - On the Nature of the Corrupt Firm: Where to Situate Liability?

V-34-05 Johann Graf Lambsdorff – Consequences and Causes of Corruption – What do We Know from a Cross-Section of Countries?

V-35-05 Stephan Heblich - Arbeitszeitflexibilisierung Revisited

V-36-05 Oliver Falck und Stephan Heblich - Das Konzept der eigenverantwortlichen Generation zur Bewältigung des demographischen Wandels

V-37-05 Florian Birkenfeld, Daniel Gastl, Stephan Heblich, Ferry Lienert, Mascha Maergoyz, Oksana Mont und Andrius Plepys - Product ban versus risk management by setting emission and technology requirements – the effect of different regulatory schemes taking the use of trichloroethylene in Sweden and Germany as an example

V-38-05 Johann Graf Lambsdorff - Determining Trends for Perceived Levels of Corruption

V-39-05 Oliver Falck - Mayflies and Long-Distance Runners: The Effects of New Business Formation on Industry Growth

V-40-05 Johann Graf Lambsdorff und Christian Engelen - Hares and Stags in Argentinean Debt Restructuring

V-41-05 Johann Graf Lambsdorff und Mathias Nell – Let Them Take Gifts, and Cheat Those Who Seek Influence

V-42-06 Hans Joachim Allinger – Bürgerversicherung und Kopfpauschale haben vieles gemeinsam – Anmerkungen zur Diskussion einer Reform der gesetzlichen Krankenversicherung

V-43-06 Michael Schinke und Johann Graf Lambsdorff - Insider Trading among Central Bankers – a Treatise on Temptation and Policy Choice

V-44-06 Johann Graf Lambsdorff und Hady Fink - Combating Corruption in Colombia: Perceptions and Achievements

V-45-06 Oliver Falck und Stephan Heblich - Corporate Social Responsibility: Einbettung des Unternehmens in das Wirtschaftssystem

V-46-06 Johann Graf Lambsdorff und Luka Bajec - There Is No Bank Lending Channel!

V-47-06 Christian Engelen und Johann Graf Lambsdorff - Das Keynesianische Konsensmodell

V-48-07 Stephan Heblich - Eigenverantwortliche Individuen und Pro-Aktive Unternehmen

V-49-07 Christian Engelen und Johann Graf Lambsdorff - Das Keynesianische Konsensmodell einer offenen Volkswirtschaft

V-50-07 Christian Engelen und Johann Graf Lambsdorff - Fairness in Sovereign Debt Restructuring

V-51-07 Johann Graf Lambsdorff und Björn Frank - Corrupt Reciprocity - an Experiment

V-52-07 Mathias Nell - Strategic Aspects of Voluntary Disclosure Programs for Corruption Offences - Towards a Design of Good Practice -

V-53-07 Mathias Nell - Contracts Induced by Means of Bribery - Should they be Void or Valid?

V-54-08 Michael Pflüger – Die Neue Ökonomische Geographie: Ein Überblick

V-55-08 Florian Birkenfeld und Shima'a Hanafy - Wie zentral sind die Abschlussprüfungen an deutschen Schulen wirklich?"

V-56-08 Florian Birkenfeld - Kleine Klassen und gute Luft - Warum sind die Grundschulen auf dem Land besser?

V-57-08 Johann Graf Lambsdorff – The Organization of Anticorruption – Getting Incentives Right!

V-58-09 Oliver Farhauer und Alexandra Kröll - Verfahren zur Messung räumlicher Konzentration und regionaler Spezialisierung in der Regionalökonomik

V-59-09 Oliver Farhauer und Alexandra Kröll - Die Shift-Share-Analyse als Instrument der Regional- und Clusterforschung

V-60-10 Johann Graf Lambsdorff – Deterrence and Constrained Enforcement – Alternative Regimes to Deal with Bribery

V-61-10 Johann Graf Lambsdorff – Who Accepts Bribery? Evidence from a Global Household Survey

V-62-10 Oliver Farhauer und Alexandra Kröll – What We Can and What We Can't Say About Employment Growth in Specialised Cities

V-63-11 Johann Graf Lambsdorff, Manuel Schubert und Marcus Giamattei – On the Role of Heuristics - Experimental Evidence on Inflation Dynamics

V- 64-12 Manuel Schubert und Johann Graf Lambsdorff – On the Costs of Kindness - An Experimental Investigation of Guilty Minds and Negative Reciprocity

V-65-12 Manuel Schubert – Deeds rather than Omissions - How Intended Consequences Provoke Negative Reciprocity

V-66-12 Agnes Binagwaho, Renate Hartwig, Denyse Ingeri und Andrew Makaka – Mutual Health Insurance and its Contribution to Improving Child Health in Rwanda