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GENERAL MODEL OF THE HOUSEHOLD ECONOMY TESTED IN THREE RURAL COMMUNITIES OF MEXICO [1]

UN MODELO GENERAL DE ECONOMÍA DOMÉSTICA PROBADO EN TRES COMUNIDADES RURALES DE MÉXICO

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RESUMEN

Se probó un modelo general de economías domésticas en tres comunidades rurales en la cuenca del río Atoyac (en el estado de Oaxaca). La información se obtuvo mediante una encuesta probabilística, y las ecuaciones del modelo se construyeron utilizando la regresión ordinaria de mínimos cuadrados. Se determinaron las principales fuentes de ingresos que contribuyen a mantener el nivel de bienestar del hogar; también se identificaron las variables de capital humano que permiten el acceso a esas fuentes y restricciones. Las economías domésticas están globalizadas, pero al mismo tiempo están arraigadas en las actividades de subsistencia y recolección. Las prácticas sociales permiten recibir transferencias de otros hogares, que, junto con las transferencias del gobierno, son fuentes de ingresos. Bajo ciertas condiciones, estos dos tipos de transferencias pueden restringirse. Las relaciones entre el bienestar del hogar y las variables independientes no fueron lineales en todos los casos, ya que se encontraron varias formas exponenciales compuestas y una forma cuadrática. Las formas no lineales se asociaron no solo con las variables de capital humano, sino también con los ingresos monetarios y no monetarios.

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ABSTRACT

A general model of household economies was tested in three rural communities in the Atoyac River basin (in the state of Oaxaca). The information was obtained by a probabilistic survey, and the model equations were built using ordinary least squares regression. The main sources of income that contribute to sustain the level of household wellbeing were determined; also identified were the human capital variables that allow access to those sources and restrictions. Household economies are globalized, but at the same time, are rooted in subsistence and collection activities. Social practices allow the receiving of transfers from other households, which, along with government transfers, are sources of income. Under certain conditions, these two types of transfers can become restricted. The relationships between household wellbeing and independent variables were not linear in all cases, since several composite exponential forms and a quadratic form were found. Nonlinear forms were associated not only with the variables of human capital, but also with monetary and non-monetary incomes.

PALABRAS CLAVE
Bienestar familiar, capital humano, ingreso monetario
KEYWORDS
Household wellbeing, human capital, monetary income.

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The first antecedents of the theoretical model of the rural household economies are recent (Morales and Gijón Cruz, 2011 and 2012). Unlike the welfare approach of Sen (1985 and 2000), which is of rather qualitative nature, and that of Boltvinik (2003), which of empirical, our model is a multivariate function of household wellbeing similar to the general equilibrium model for rural communities exposed by Adelman and Taylor (1996) and Sadoulet and De Janvry (1995). Both our model, and the general equilibrium one, share the database used to construct the social accounting matrix. Notable differences between the two models show that the latter relies on the social accounting matrix and multiplier models, while the former uses multisectoral econometric models.

THE THEORETICAL MODEL OF THE HOUSEHOLD ECONOMIES

Household income (*HI*) is assigned to household consumption (*C*), investment in business and self-production (*Inv*), and savings in financial institutions and batches (*Sav*) [1.1]:

$$HI = C + Inv + Sav \qquad [1.1]$$

Solve for *C* in the equation [1.1] and the consumption equation is obtained:

$$C = HI - (Inv + Sav) \qquad [1.2]$$

If *C* is defined exhaustively, it will contain the following items of expenditure: food, education, health, housing and its services, furniture and appliances, transportation, parties, and gifts. When socioeconomic characteristics of the household such as household size (*HS*), number of women (*Nwom*), average age (*Avage*), and average schooling (*Avsch*) are added to equation [1.2], *BF* is explained through them, with *C* being approximately equal to household wellbeing. Therefore, one can establish the equation *HWB*:

$$HWB = a_1HI - (a_2Inv + a_3Sav) \pm (a_4HS + a_5Nwom + a_6Avage + a_7Avsch) \qquad [1.2]$$

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The HI is defined as the sum of all income earned by household members from the following: labor markets (i.e., local wages (*LW*), regional wages (*RW*), internal remittances (*NR*), international remittances (*RI*)), the sale of the production business and the monetary value of subsistence production (net income of commercial business (*NICB*), net income of service businesses (*NISB*), net income of small-scale manufacturing (*NIMM*), net income of food production of animal origin (*NIFPAO*), net income of agriculture (*NIA*), net income of livestock (*NIL*), net income of cut firewood (*NICF*), and revenues of financial markets (loans (*Lo*) and interest income (*II*)). In addition, government transfers (*GT*) and transfers from other households (*TOH*) are taken into account.

$$HI = b_1LW + b_2RW + b_3NR + b_4IR + b_5NICB + b_6NISB + b_7NIMM + b_8NIFPAO + b_9NIA + b_{10}NIL + b_{11}NICF + b_{12}Lo + b_{13}II + b_{14}GT + b_{14}TOH \quad [1.3]$$

Substituting the right side of Equation [1.3] to Equation [1.2] and simplifying yields:

$$HWB = c_1LW + c_2RW + c_3NR + c_4IR + c_5NICB + c_6NISB + c_7NIMM + c_8NIFPAO + c_9NIA + c_{10}NIL + c_{11}NICF + c_{12}Lo + c_{13}II + c_{14}Sav + c_{15}GT + c_{16}TOH - (c_{17}Sav + c_{18}Inv) \pm (c_{19}HS + c_{20}Nwom + c_{21}Avage + c_{22}Avsch) \quad [1.4]$$

A portion of equation [1.2] ($a_2Inv + a_3SAV$) is changed from negative to positive in equation [1.4] ($c_{14}Sav$) specifically representing the fraction of savings available for consumption and investment as a source of income, while $c_{17}Sa$ - the fraction of savings not available - retains the negative sign. A negative variable in the equation reduces household wellbeing in proportion to their coefficient. The term a_2Inv is replaced by $kIN + Inv$, where k is a constant, and IN is the net income obtained from Inv in business and subsistence production. Therefore, $IN = c_5NICB + c_6NISB + c_9NIA + c_8NIFPAO + c_7NIMM + c_{11}NICF + c_{10}NIL$. The remaining fraction is reinvested Inv, which also has a negative sign ($c_{18}Inv$), not allocating $c_{17}Ah$ to the household expenses.

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METHODS

SURVEY

The survey questionnaire is a revised and expanded version of the one designed by Yúnez-Naude and Taylor (1999) and was applied to a sample of households in three rural communities located on the Atoyac river basin in the Central Valleys region of the state of Oaxaca. The survey questionnaire consisted of these sections:

1. Socio-economic characteristics of the household
2. Household expenses
3. International migration
4. Internal migration
5. Local and regional wage labor
6. Family businesses
7. Fuelwood collection
8. Agriculture
9. Livestock
10. Other income, savings and loans

The sample sizes of the three communities surveyed were 25, 28, and 32 households which were the result of random sampling. As for the samples, they represent between 17.6 and 32 % of the total number of households. The minimum number of households was 25, which is recommended by Yúnez-Naude and Taylor (1999) for rural communities in Mexico with a population between 500 and 2,500 inhabitants.

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EQUATIONS OF THE HOUSEHOLD ECONOMY MODEL

The model equations were built using ordinary least squares regression aided by IBM SPSS - version 21. Both linear and non-linear forms of the independent variables were considered. The dependent variable is the household wellbeing (*HWB*). The independent variables include those of household income (equation [1.3]), as well as savings, investment, and human capital (average age, average schooling, household size, and number of women per household).

The general regression equation of the household economy is expressed in equation [2.0] which is an extension of equation [1.4], to which non-linear forms were added to the quadratic forms in income of labor markets (*LW, RW, NR, IR*) and in socioeconomic characteristics (*HS, Nwom, Avage, Avsch*). These types of variables can take nonlinear forms according to Winter *et al*. (1999), and Bode and Morris (1994).

$$HWB_j = \alpha_0 + \alpha_{1j}LW + \alpha_{2j}LW^2 + \alpha_{3j}RW + \alpha_{4j}RW^2 + \alpha_{5j}NR + \alpha_{6j}NR^2 + \alpha_{7j}IR + \alpha_{8j}IR^2 + \alpha_{9j}NICB + \alpha_{10j}NISB + \alpha_{11j}NIMM + \alpha_{12j}NIFPAO + \alpha_{13j}NIA + \alpha_{14j}NIL + \alpha_{15j}NICF + \alpha_{16j}Lo + \alpha_{17j}II + \alpha_{18j}Sav + \alpha_{19j}HS + \alpha_{20j}HS^2 + \alpha_{21j}Nwom + \alpha_{22j}Nwom^2 + \alpha_{23j}Avage + \alpha_{24j}Avage^2 + \alpha_{25j}Avsch + \alpha_{26j}Avsch^2 + \varepsilon_j \quad [2.0]$$

Where $j = 1, 2, \ldots n$ and ε is the random error term; n is the sample size and the coefficients α_{ij} including α_0 are constants whose values will be estimated by the technique of OLS. The term $-(c_{17}Sav + c_{18}Inv)$ of equation [1.4] does not appear explicit in equation [2.0]; and this term may even be null when in the year of reference *Sav* is totally consumed and the total net income of investment in economic activities is obtained. By contrast, if the term $-(c_{17}Ah + c_{18}Inv)$ is different from zero, this means that part of the savings was not spent and part of the net income of investment will be obtained beyond the year of reference.

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The criteria for selecting the regression equations were: (1) the coefficient of multiple determination, R^2, must be > 0.5, (2) the regression equation should stand the test of the analysis of variance (ANOVA), i.e., the F statistic should be significant ($p < 0.05$), and (3) all regression coefficients B, including the constant term α_0, should be significant according to the Student t-test ($p < 0.05$).

EMPIRICAL MODEL OF THE HOUSEHOLD ECONOMY

Characteristics of household economy of the studied communities

The main sources of income of households in S.M. Vigallo, Barda P.P. and S.J. Zegache are shown in Fig 1. Common sources in the three communities include: government transfers, agriculture and cut firewood which characterize them as traditional rural communities and dependent on government support; and specifically for community stands: local wages in S.M. Vigallo; international remittances, livestock and loans in S.J. Zegache; and in Barda P.P. internal remittances, business and transfers coming from other households. The most integrated local market economy is undoubtedly S.J. Zegache's, while S.M. Vigallo has a rather autarkic economy. Representative occupations generating these jobs in agriculture are either farmers with land, or farm laborers who work for wages (Fig. 2). Other emerging occupations that show a certain degree of specialization in the workforce are by branch of activity: construction (mason and bricklayer's assistant), services (mechanic, office employee, auxiliary services), and tertiary sector (business owner). There is a visible fraction of the workforce that does not have a specified occupation and, in particular, sticks out in S.J. Zegache. This can be associated with the integration of the rural labor force to non-agricultural activities in the region. At first, the laborers and peasants enroll in various occupations temporarily, and often fail to settle in a specific activity. Under these conditions and in the absence of irrigated, small-scale agriculture to provide income and wages, the labor force to sustain their homes resorts to external labor markets (regional wages, internal remittances and international remittances) and government transfers.

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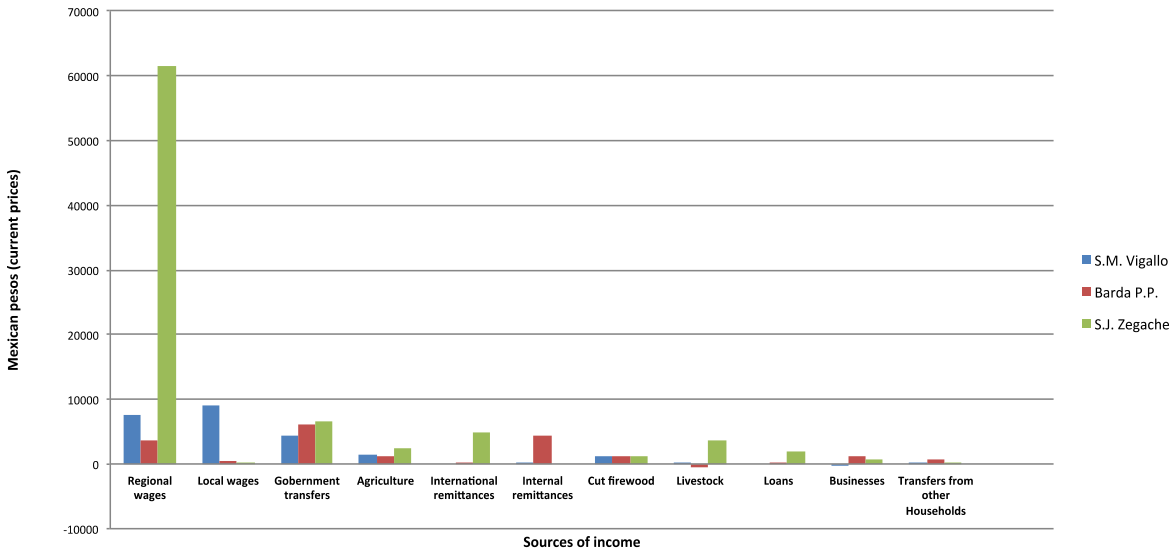

Fig. 1. Average income by source of the households in S. M. Vigallo, Barda P.P. y S. J. Zegache, Oaxaca, México, 2014.

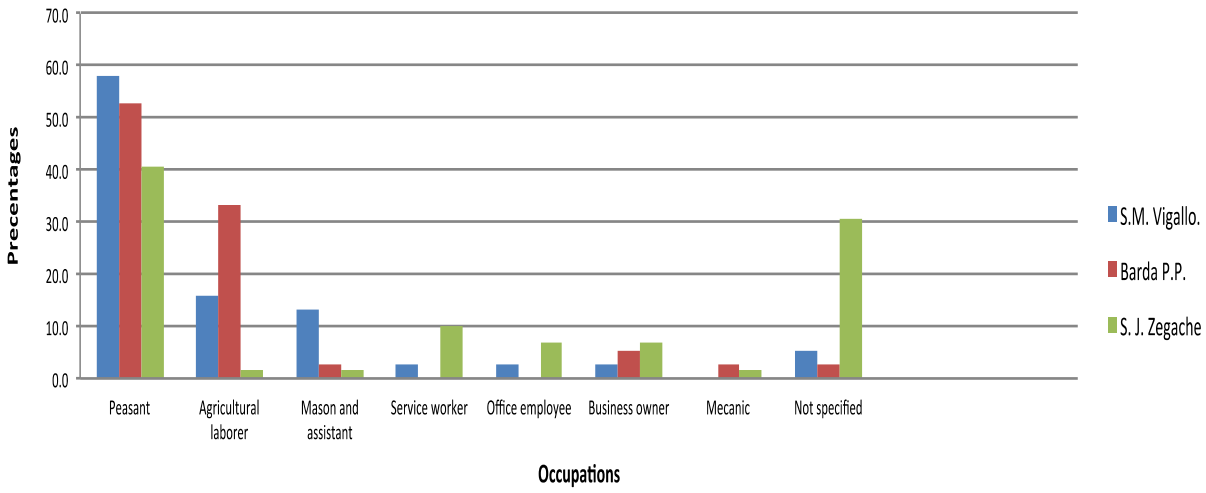

Fig. 2. Occupational structure of S. M. Vigallo, Barda P.P. y S. J. Zegache, Oaxaca, México, 2014.

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The household economy in these communities support a household wellbeing level whose structure is shown in Fig. 3. S.J. Zegache and Barda P.P. allocate an average of 93.3% of the wellbeing budget on food, education, housing services, parties, and consumables, while S.M. Vigallo spends 84% on food, health, parties and consumables, and education. The households of S.J. Zegache are those allotted the largest budget regarding wellbeing, while S.M. Vigallo is visibly the poorest and most vulnerable community of the three. Health spending is an indicator of vulnerability, since households without enough money to ensure adequate food for its members are susceptible to an increase of disease.

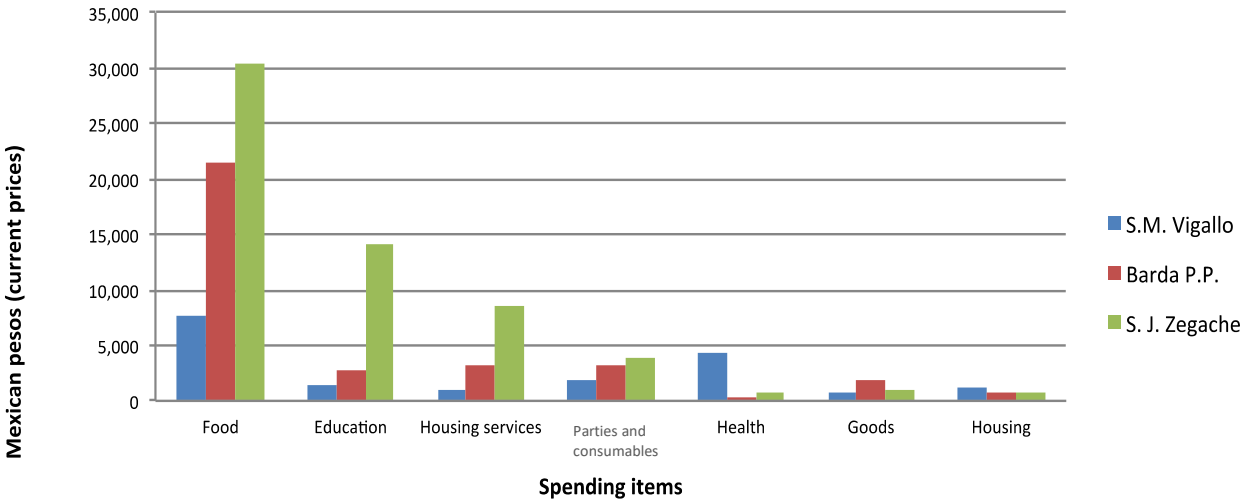

Fig. 3. Average values of the household wellbeing items in S. M. Vigallo, Barda P.P. y S. J. Zegache, Oaxaca, México, 2014.

Fig. 3 shows that households of S.M. Vigallo spent less on food because they consume their agricultural production. This is reflected in the relatively high expenditure on health, as members of households are more likely to get sick. The rest of the income expenditure is spent on parties and other consumer goods. By contrast, Barda P.P.'s largest item of household spending is food, and as a result, health expenditure is only about 5% - meaning a better diet correlates with less health spending. In

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S.J. Zegache, households spend more on food, education, and housing services, thus spending on health is very small. Annual spending on education enables its workforce to access better paid jobs, and spending on housing services ensures a better level of household wellbeing than that of the other two communities.

RESULTS OF THE MODEL HOUSEHOLD WELLBEING

The household economy models of S.M. Vigallo, Barda P.P., and S.J. Zegache have six regression equations. These equations contain 17 different independent variables that provide both linear and linear causal relationships with *HWB*. All equations usually stand the test of analysis of variance, that is, the F statistic is significant ($p < 0.000$) and the coefficient of multiple determination (R^2) is greater than 0.61 in all cases (Tables 1 and 2). Equations [2.1], [2.2], [2.3] and [2.4] corresponding with S.M. Vigallo and La Barda P.P. also meet Student's t-test since all regression coefficients are significant ($p < 0.05$), while the implication of *NICB*, *TG*, *LW* and *IR* variables in equations [2.5] and [2.6] (S.J. Zegache) didn't reach the recommended level ($p < 0.05$). Note that the t-test values are shown in Tables 1 and 2; the significance values appear below each end of the regression equations. Therefore, we can say that the model of family economies in the three communities is acceptable.

$$\underset{(0.000)}{\textbf{\textit{HWB}}} = \underset{(0.000)}{5206.157\ \textbf{\textit{Nwom}}} + \underset{(0.000)}{8.402\ \textbf{\textit{NIL}}} + \underset{(0.000)}{0.268\ (4.180)^{\textit{Avsch}}} + \underset{(0.000)}{0.001\ (1.001)^{\textit{NICF}}} - \underset{(0.020)}{520.372\ \textbf{\textit{NR}}} \quad [2.1]$$

$$\underset{(0.000)}{\textbf{\textit{BF}}} = \underset{(0.000)}{251.079\ \textbf{\textit{Avsch}}^2} + \underset{(0.000)}{0.218\ (4.180)^{\textit{Avsch}}} + \underset{(0.004)}{0.001\ (11.237)^{\textit{GT}}} + \underset{(0.000)}{0.001\ (1.001)^{\textit{NICF}}} - \underset{(0.000)}{0.212\ (1.000)^{\textit{RW}}} \quad [2.2]$$

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HWB = 3,667.455 ***TH*** + 2,514.731 ***Esprom*** + 0.419 ***RN***

[2.3]

(0.009) (0.014) (0.026)

HWB **=** 2735.005 ***Esprom*** + 5.755 ***TOH*** - 682.947 **Edprom**

[2.4]

(0.027) (0.011) (0.000)

HWB = 1.034***NIL*** + 0.556***Avsch*** + 0.191***Avage*** + 0.172***NISB*** + 0.153***IR*** + 0.151***Sav*** +

(0.000) (0.000) (0.000) (0.000) (0.001) (0.002)

0.137***Lo*** - 0.163***NICB*** - 0.193***GT*** - 0.278***TOH*** - 0.562***NIA*** [2.5]

(0.009) (0.057) (0.087) (0.001) (0.000)

HWB = 2.134***NIL*** + 0.507***Avsch*** + 0.248***Avage*** + 0.295***NISB*** + 0.265***Sav*** + 0.234***Lo*** +

(0.000) (0.000) (0.000) (0.000) (0.001) (0.002)

0.206***Nwom*** + 0.122***LW*** + 0.102***IR*** - 0.332***GT*** - 0.560***TOH*** - 1.296***NIA***

[2.6]

(0.009) (0.057) (0.087) (0.001) (0.000) (0.000)

Fig. 4 shows the 17 variables of the model of household economies distributed in the six equations are by community. Regression equations of each community contain at least one variable that is not in the equations of the other communities, and these kind of variables are specific features of the economies. The exclusive variables in S.M. Vigallo are wages obtained from regional labor markets for its workforce and net income of cut firewood versus Barda P.P. where all household members are involved in

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obtaining the current level of *HWB*. S.J. Zegache has the most diversified economy of all three since its variables include the income of the three types of markets: labor (*IR* and *LW*), financial (*Sav* and *Lo*), and goods and services (*NISB*, *NICB* and *NIA*). Therefore, these distinctive variables show household economies strongly linked to the market economy. The three communities also have an affinity, which manifests itself through common variables resulting from the comparison of their equations. The equations from S.J. Zegache and S.M. Vigallo share three variables (*Nwom*, *NIL*, and *GT*) which show a common dependence on female labor, backyard livestock, and government transfers to sustain its level of *HWB*. These characteristics of household economies are typical of a peasant economy. The S.J. Zegache and Barda P.P. equations have both the *TOH* and *Avage* in common, while *GT* are replaced by social capital (*TOH*) and another characteristic of human capital emerges. Finally, Barda P.P. and S.M. Vigallo only share remittances obtained from national labor markets (*NR*). The seven common variables of the six equations point to human capital (*Nwom* and *Avage*) as the mainstay of household economies with internal remittances (*NR*), transfers from other households and government (*TOH* and *GT*), and subsistence activities (*NIL*). It is rural household economies whose main resource is human capital and transfers that also require the production and consumption not only for subsistence, but also to achieve the goals of household wellbeing. In short, the exclusive variables of the equations show the resources of household economies and their common variables as well as traditional characteristics and dependence on the government. In fact, both are part of the same economies because the multisectoral nature of the theoretical model allows us to see different angles of the same object of study (household, community, household economy, local economy, government, markets, subsistence production, and links within the region, the rest of the country, and other countries).

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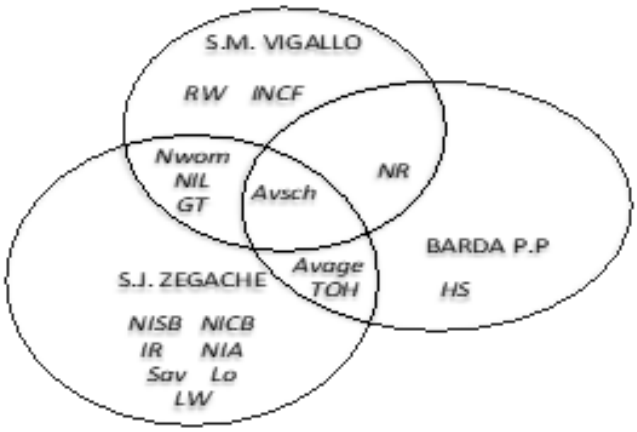

Fig. 4 Interrelations between the equations of the model of household economies through their independent variables by community.

Model of S.M. Vigallo. Of the seven different independent variables in the equations [2.1] and [2.2] of this community, composed exponential forms appear: average *Avsch*, *NICF*, *GT*, and *RW*. *Avsch* also appears in equation [2.2] in quadratic and compound forms. However, the *Nwom*, *NIL*, and *NR* appear in linear form as the other ten independent variables in equations [2.3] to [2.6]. Only *NR* and exponentially composed *RW* have a negative sign in the equations [2.1] and [2.2], therefore, these indicate an inverse causal relationship to *HWB*. Other independent variables with positive sign have a directly proportional relationship with *HWB*. Of course, a direct or inverse relationship between an independent linear variable and *HWB* is different when the independent variable is nonlinear. It is observed that *HWB* always will be linear in the analysis of linear least squares regression. Thus, the linear relationship between an independent variable and *HWB* is confined to a straight line whose slope is the regression coefficient, and its weight is given by standardized regression coefficient beta (tables

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1 and 2). When the independent variable is nonlinear, the relationship describes a curved line that may have many possible paths, and even maximum and minimum points. In this case, the beta coefficients are not always useful and the graph of the partial derivatives of the *HWB* equation are more useful to understand with precision the type relationship that exists with the dependent variable in the range given by the sample size. Due to space constraints, the graphs of nonlinear variables are not present, but a brief description of these appears. Graphs of exponential composite variables curve in both equations, as in S.M. Vigallo, where there are two sections: the longer is asymptotic, and the shorter is almost a straight line with a slope close to the line 90. The quadratic form $251.079Avsch^2$ is the rising section of a parabola. Therefore, in Equation [2.2] where *Avsch* is a complex nonlinear function $(251.079Avsch^2 + 0.218(4.180)^{Avsch})$ it will take a similar form to the quadratic structure of *Avsch*.

As you can see in tables 1 and 2, the average schooling, in their exponentially composite or quadratic forms, have the highest weight (betas) and follow in descending order: the value of the cut firewood (exponentially composite), number of women in the household, and net income of livestock. The latter two are linear. S.M. Vigallo is a relatively isolated rural community, therefore, income in kind for gathering firewood contributes significantly to the level of household wellbeing as does backyard livestock and the female labor force. Women are housewives, daughters, and daughters-in-law, and it is they who are responsible for domestic work, but the women also play an important role in backyard livestock, part-time involvement in agriculture, and earning wages. It is noteworthy that the monetary income does not contribute to *HWB* and restricts rather as internal remittances and regional wages appear with negative sign in the equations [2.1] and [2.2]. The weight of these variables counteracts the weight of average schooling. The explanation is this: the average household schooling explains the level of household income and the bigger fraction of it determines the level of *HWB*. The other fraction, which includes domestic remittances and regional wages, is allocated to savings and investment. Thus, from the logic of the model of household economies, internal remittances and regional wages did not contribute to the level of wellbeing because they are not allocated to consumption. However,

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households use this income to invest in productive activities, or as a savings fund aimed at achieving other family goals.

Model of Barda P.P. The average schooling still has an important weight in the *HWB* and competes with household size and transfers received from other households whose weights are slightly higher. Unlike S.M. Vigallo, internal remittances contribute to *HWB*, namely, a significant portion of them are allocated to consumption. The fact that household size replaces the number of women in the household means that both men and women contribute the same effort regarding *HWB*. Transfers from other households are a form of income for recipient households, and also represent a monetary measure of social capital. The average age is inversely related to the *HWB* because the average age of the households in this community is 40 years. Thus, an increase in this variable means that the workforce is aging rapidly, which in turn reduces their chances in the labor market as well as their performance in subsistence activities and in the family business.

Model of S.J. Zegache. This community is more integrated to regional markets and its small-scale irrigated agriculture sustains livestock whose profitability is short term. The independent variables with a positive sign in the equations [2.5] and [2.6] are grouped in income from the market economy (*MIL*, *NISB*, *RI*, *Sav*, *Lo*, and *SL*) and socioeconomic characteristics (*Avsch*, *Avage*, and *Nwom*). These two groups of variables compete to hold *HWB* level, i.e., a unit increase in these variables corresponds to a proportional increase in *HWB* given by their regression coefficients. The weights of the common variables with a positive sign in the equations [2.5] and [2.6] are consistent with respect to the hierarchical order of their weights, except *IR* which descends from fifth place to last if *Nwom* and *LW* appear. Equation [2.2] of S.M. Vigallo and equation [2.4] of Barda P.P. include the following variables with a positive sign: government transfers and transfers received from other households. These variables change sign in the equations [2.5] and [2.6] of S.J. Zegache; they went from being resources to become restrictions of the *HWB*. In the same equations two other constraints are added: net income of commercial businesses (*NICB*) and net income of agriculture (*NIA*). The explanation of *NICB* refers

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to the low profitability of commercial businesses due to stiff competition from the nearby regional markets. The *NIA* also has low profitability compared to *NISB*, *NIL* and *IR*. And so, for every Mexican peso invested in commercial businesses and agriculture, there occurs a reduction in *HWB* proportional to the regression coefficients of these variables in equations [2.5] and [2.6]. The GT are allocated to business investment and self-consumption activities along with other sources of income. Evidently, *NICB*, *NIA*, and *GT* serve as a catalyst for investment and it's for this reason they contribute to contract the level of *HWB*. The *TOH* are part of a reciprocal relationship between households of this community. Households receive gifts in cash and kind, but they will have to return the donation, which is recorded as an expense, so it is part of the structure of *HWB*. When the net income from given gifts and received gifts for the households cause deficit, the *HWB* will shrink. Actually, this is what is happening in S.J. Zegache.

CONCLUSIONS

The theoretical model of rural household economies identifies the most likely sources of income that contribute to family welfare and the variables of human and social capital that allow access to them along with the constraints facing households. An increase in the level of welfare is the incentive for income markets (labor, capital, goods, and services), the government, and other households through transfers. Also, the annual expenditure on education, household size, the female labor force, and the incorporation of children into the labor market are household strategies to raise the level of welfare.

Correlations between household wellbeing and independent variables were not always linear. The variables *Avsch*, *NICF*, *GT* and *RW* have made exponential forms, and even *Avsch* in equation [1.2] S.M. Vigallo was presented as a complex function. Thus, the general theoretical regression equation was overtaken by reality as quadratic forms were rare, and alternately exponential forms were frequent.

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Furthermore, non-linear forms were associated not only with human capital and monetary income, but also in non-cash income (*NICF*).

It is concluded that the relatively isolated rural economies (S.M. Vigallo and Barda P.P.) as well as those located near markets (S.J. Zegache) have strong linkages with the national and international economies through internal and international remittances. Subsistence activities and social capital (*TOH*) are elements of the ancestral autarkic economy that competes with government transfers. Consequently, rural household economies in the Atoyac River basin of Oaxaca state have a certain degree of globalization as they are strongly tied to their natural and cultural environment through subsistence activities and social practices.

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Table 1 Standardized regression coefficients and t student statistic of the regression equations 1.1, 1.3 and 1.5.

Variables	Santa María Vigallo		Barda Corral de Piedra		San Gerónimo Zegache	
	β	t student	β	t student	β	t student
Number of women in the household, ***Nwom***	0.311	4.863				
Net income of livestock, ***NIL***	0.146	2.467			1.034	5.604
Average schooling, ***Avsch***			0.44	2.678	0.556	5.705
(4.180)^{Avsch}	15.582	11.170				
Compound model of net income of cut firewood, (1.001)^{NICF}	0.393	6.736				
Internal remittances, ***NR***	-15.518	-11.150	0.178	2.394		
Household size, ***HS***			0.471	2.876		
Average age, ***Avage***					0.191	1.758
Net income of de services businesses, ***NISB***					0.172	3.428
International remittances, ***IR***					0.153	2.999
Savings, ***Sav***					0.151	2.916
Loans, ***Lo***					0.137	2.450
Net income of commercial businesses, ***NICB***					-0.163	-2.572
Government transfers, ***GT***					-0.193	-2.236
Transfers from other households, ***TOH***					-0.278	-4.929
Net income of agriculture, ***NIA***					-0.562	-3.201
R^2	0.953		0.884		0.971	
R^2 adjusted	0.892		0.869		0.950	
F statistic	55.595	p < 0.000	56.082	p < 0.000	46.196	p < 0.000
Degrees of freedom of the regression and total	5 and 33		3 and 25		11 and 26	

Source: Database of the survey of Santa Maria Vigallo, Barda Corral de Piedra, and San Gerónimo Zegache. The analysis of ordinary least squares regression was performed aided by SPSS version 21 using the following methods: Enter, Stepwise, Delete, Forward, and Backward.

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Table 2 Standardized regression coefficients and t student statistic of the regression equations 1.2, 1.4 and 1.6.

Variables	Sta. María Vigallo		Barda Corral de Piedra		San Gerónimo Zegache	
	β	t student	β	t student	β	t student
Number of women in the household, ***Nwom***					0.206	3.091
Net income of livestock, ***NIL***					2.134	11.155
Average schooling, ***Avsch***			0.411	2.381	0.507	6.234
Avsch^2	12.677	8.004				
(4.180)^{Savsch}	0.397	5.013				
Compound model of net income of cut firewood, (1.001)^{NICF}	0.389	6.930				
Compound model of regional wages, (1.000)^{RW}	-12.743	-8.157				
Average age, ***Avage***			-0.741	-4.548	0.428	4.650
Net income of services businesses, ***INSB***					0.295	4.850
International remittances, ***IR***					0.102	1.851
Savings, ***Sav***					0.265	4.285
Loans, ***Lo***					0.234	3.740
Locale wages, ***SW***					0.122	2.086
Government transfers, ***GT***					-0.332	-4.390
(11.237)^{TG}	0.178	3.149				
Transfers from other households, ***TOH***			0.501	2.789	-0.560	-8.050
Net income of agriculture, ***NIA***					-1.296	-6.910
R^2	0.915		0.615		0.966	
R^2 adjusted	0.9		0.56		0.935	
F statistic	34.287 $p < 0.000$		11.193 $p < 0.000$		31.001 $p < 0.000$	
Degrees of freedom of the regression and total	5 and 33		3 and 24		12 and 25	

Source: Database of the survey of Santa Maria Vigallo, Barda Corral de Piedra, and San Gerónimo Zegache; the analysis of ordinary least squares regression was performed aided by SPSS version 21 using the following methods: Enter, Stepwise, Delete, Forward, and Backward.

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